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THE

ENGLISH FLORA

OF

SIR JAMES EDWARD SMITH.

CLASS XXIV. CRYPTOGAMIA,

BY

SIR WILLIAM JACKSON HOOKER,

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AND DIRECTOR OF THE ROYAL BOTANIC GARDENS OF KEW.

VOL. V.

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

PART I.

COMPRISING THE

MOSSES, HEPATICÆ, LICHENS, CHARACEÆ, AND ALGÆ.

LONDON:

LONGMAN, BROWN, GREEN, AND LONGMANS,

PATERNOSTER-ROW.

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TO

MRS. GRIFFITHS,

OF TORQUAY, DEVON,

BY WHOSE ACTIVE RESEARCHES UPON A COAST PRE-EMINENT NO LESS FOR THE VARIETY OF ITS MARINE PRODUCTIONS, THAN FOR ITS PICTURESQUE BEAUTY,

THE BRITISH ALGÆ

HAVE BEEN EXTENSIVELY ILLUSTRATED,

THE PRESENT VOLUME,

INCLUDING MANY OF HER DISCOVERIES,

IS DEDICATED

WITH SENTIMENTS OF UNFEIGNED REGARD AND ESTEEM,

BY HER FAITHFUL AND OBLIGED FRIEND,

THE AUTHOR.

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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 allusion

to the different Orders of the Class CRYPTOGAMIA, "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 intreat 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 Cryptogamic Botany, that Messrs. Turner and Borrer would 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 two parts of a single volume, five 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.

CLASS XXIV.

CRYPTOGAMIA — CONTINUED.

ORDER II. MUSCI. *Linn.* Mosses.

Fructification, so called, of 2 kinds; *Anthers* 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 CRYPTOGAMIA, 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 Linnæus, "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.

Synopsis of the Genera.

Sect. I. *Seta (or fruitstalk) terminal.* (Dicranum *only offers a few exceptions.*) Acrocarpi.

Subsect. I. *Lid adhering to the mouth of the capsule, which is destitute of peristome.* Astomi.

1. Andræa. *Capsule* 4-valved.
2. Phascum. *Capsule* entire.

Subsect. II. *Lid deciduous; mouth of the capsule naked.* Gymnostomi.

3. Sphagnum. *Capsule* sessile on a soft pedunculated *receptacle* which resembles a fruitstalk. *Calyptra* irregularly torn.

4. Œdopódium. *Seta* elongated, thick, fleshy. *Calyptra* dimidiato-mitriform.

5. Gymnóstomum. *Seta* more or less elongated, slender, rigid. *Calyptra* dimidiate.

6. Anictángium. *Seta* more or less elongated. *Calyptra* mitriform.

7. Schistóstega. *Seta* elongated. *Lid* very thick, marked, with radiating cells. *Calyptra* campanulate, at length cleft.

Subsect. III. *Lid deciduous; mouth of the capsule furnished with a peristome.* Peristomi.

Div. I. *Peristome single.* Aploperistomi.

8. Diphýscium. *Peristome* a cone-shaped, plaited membrane. *Capsule* oblique.

9. Tétraphis. *Peristome* of 4 teeth.

10. Splánchnum. *Peristome* of 8 or 16 geminating teeth. *Capsule* with an evident *apophysis.*

11. Cýrtodon. *Peristome* of 16, equidistant, entire teeth, marked with a central line, incurved when dry. *Capsule* with an *apophysis.* *Calyptra* glabrous, without furrows.

12. Conóstomum. *Peristome* of 16, equidistant teeth, united at their summits.

13. Encalýpta. *Peristome* of 16 teeth. *Calyptra* campanulate, smooth, entirely enclosing the mature *capsule.*

14. Weíssia. *Peristome* of 16, entire, equidistant teeth. *Calyptra* dimidiate.

15. Grímmia. *Peristome* of 16, entire or perforated, rarely cleft, equidistant teeth. *Calyptra* mitriform.

16. Didýmodon. *Peristome* of 16 or 32 teeth, approaching in pairs or united at the base. *Calyptra* dimidiate.

17. Trichóstomum. *Peristome* of 16, equal teeth, divided to the base, or 32 placed together in pairs. *Calyptra* mitriform.

18. Glyphomítrion. *Capsule* destitute of apophysis. *Peristome* of 16 teeth, approximated in pairs, reflexed when dry. *Calyptra* covering the whole capsule, entire or rarely cleft on one side and laciniated.

19. Dicránum. *Peristome* of 16, bifid, equidistant teeth. *Calyptra* dimidiate, not fringed at the base. (In some species of the first division the seta is lateral.)

20. Tórtula. *Peristome* of 32, spirally twisted teeth, more or less united at their base into a tubiform membrane.

21. Cinclidótus. *Peristome* of 32, filiform, at length twisted teeth, anastomosing at their base.

22. Polýtrichum. *Peristome* of 32 or 64 equidistant teeth, united at the extremity by a horizontal membrane. *Calyptra* dimidiate, very small.

(*See* Entosthodon *and* Orthotrichum *in* Diploperistomi.)

Div. II. *Peristome double.* Diploperistomi.

A. *Internal peristome composed of distinct teeth or cilia* (*in* Entosthodon *obsolete*).

23. Entósthodon. *Peristome* double (?); the *outer* of 16 remote (horizontal and slightly oblique) teeth, from within the mouth of the capsule; *inner* obsolete or wanting. *Capsule* with an *apophysis*.

24. Funária. *Peristome* oblique; the *outer* of 16, compact teeth; the *inner* of as many cilia opposite to the teeth of the outer. *Capsule* pyriform, its mouth oblique.

25. Zýgodon. *Outer peristome* of 16 teeth, approaching in pairs; the *inner* of 8 or 16 horizontal cilia. *Calyptra* dimidiate.

26. Orthótrichum. *Outer peristome* of 16 teeth, approaching in pairs; the *inner* of 8 or 16 horizontal cilia (sometimes wanting). *Calyptra* mitriform, sulcate.

B. *Inner peristome formed of a membrane more or less divided into laciniæ or segments.*

27. Brýum. *Outer peristome* of 16 teeth; *laciniæ* of the

inner 16, equal, frequently with filiform processes placed between them. *Calyptra* dimidiate.

28. Tímmia. *Outer peristome* of 16 teeth; *laciniæ* of the *inner* variously united at the base by transverse bars and frequently cohering at the points. *Calyptra* dimidiate.

29. Bartrámia. *Outer peristome* of 16 teeth; *laciniæ* of the *inner* 16, equal, bifid. *Calyptra* dimidiate. (*Capsule* mostly globose.)

30. Buxbaúmia. *Outer peristome* of numerous filiform, erect, jointless teeth; the *inner* a plaited membranous cone. *Capsule* oblique.

Sect. II. *Seta or fruitstalk lateral.* Pleurocarpi.

Subsect. I. *Mouth of the capsule naked.* Gymnostomi.

31. Hedwígia. *Calyptra* dimidiate.

Subsect. II. *Mouth of the capsule furnished with a peristome.* Peristomi.

Div. I. *Peristome single.* Aploperistomi.

32. Pterogónium. *Peristome* of 16, entire, equidistant teeth. *Calyptra* dimidiate.

33. Leúcodon. *Peristome* of 32 teeth, closely united in pairs. *Calyptra* dimidiate.

Div. II. *Peristome double.* Diploperistomi.

A. *Internal peristome composed of free cilia.*

34. Neckéra. *Outer peristome* of 16 teeth; *cilia* of the *inner* 16, sometimes connected at the base by a very short membrane. *Calyptra* dimidiate.

35. Anómodon. *Outer peristome* of 16 teeth; *cilia* 16, arising from the side of the teeth. *Calyptra* dimidiate.

36. Daltónia. *Outer peristome* of 16 teeth; *cilia* 16, arising from the side of the teeth. *Calyptra* mitriform.

B. *Inner peristome composed of cilia united below into a membrane or connected by transverse bars.*

37. Fontinális. *Outer peristome* of 16 teeth; *cilia* of the *inner* 16, connected by transverse bars, forming a reticulated cone. *Calyptra* mitriform.

38. Hookéria. *Outer peristome* of 16 teeth; *inner* of 16 *cilia*, united below into a membrane. *Calyptra* mitriform.

39. HÝPNUM. *Outer peristome* of 16 teeth; *inner* a membrane cut into 16 equal segments, with filiform processes frequently placed between them. *Calyptra* dimidiate.

CRYPTOGAMIA MUSCI.

SECT. I. *Seta* (or *fruitstalk*) *terminal.* (*Dicranum* alone offers a few exceptions.) ACROCARPI.[1]

SUBSECT. I. *Lid adhering to the mouth of the capsule.* ASTOMI.[2]

1. ANDRÆA. *Ehrh.* Andræa.

Caps. 4-valved, the valves cohering at the extremity by means of the persistent *lid*. *Calyptra* irregularly torn. (*Musc. Brit. t.* 1.)—Name given in honour of an Apothecary of Hanover, named *Andreæ*. Hence the Germans write it *Andreæa*.

1. A. *alpina*, Hedw. (*alpine Andræa*); stems branched, leaves obovate suddenly acuminated nerveless straight imbricating the stem on all sides. *Hedw. Sp. Musc. p.* 49. *E. Bot. t.* 1278. *Drum. Musc. Scot. v.* 2. *n.* 1. *Musc. Brit. ed.* 2. *p.* 2. *t.* 8.—*Andreæa petrophila, Ehrh.—Dill. Musc. t.* 83. *f.* 39.

Alpine rocks, but not very common. On Ben-Nevis, in the greatest abundance and perfection. *Fr.* Spring.—Foliage of a deep and glossy dark-brown colour. While the *capsule* is immature, Mr. Wilson observes the seeds to cohere in masses usually of 4, sometimes 3.

2. A. *rupéstris*, Hedw. (*rock Andræa*); stems branched, leaves ovate gradually acuminated nerveless the upper ones falcate. *Hedw. Sp. Musc. p.* 47. *t.* 7. *f.* 2. *E. Bot. t.* 1277. (not of *Fl. Brit.*) *Drum. Musc. Scot. v.* 2. *n.* 3. *Musc. Brit. ed.* 2. *p.* 2. *t.* 8.

Rocky mountainous situations, throughout Great Britain. *Fr.* Spring.—This has been often confounded with *A. Rothii*, from which it is at once distinguishable by its broad and *nerveless leaf*, and usually browner colour. It is much more allied to the preceding species, but is considerably smaller.

3. A. *Róthii*, Mohr, (*black falcate Andræa*); stems almost simple, leaves lanceolato-subulate falcato-secund fragile nerved those of the perichætium convolute, the innermost nerveless. *Mohr, Cr. Germ. p.* 386. *t.* 11. *f.* 7—9. *E. Bot. t.* 2162. *Drum. Musc. Scot. v.* 2. *n.* 2. *Musc. Brit. ed.* 2. *p.* 2. *t.* 8.—*A. rupestris, Roth,—Brid.—Fl. Brit. p.* 1178. *Dill. Musc. t.* 83. *f.* 40.

Alpine rocks, frequent. *Fr.* Spring.

[1] From *ακρον*, the *summit*, or *extremity*, and *καρπον*, the *fruit*.

[2] From *α*, *without*, and *στομα*, the *mouth*.

4. A. *nivális*, Hook. (*tall slender Andræa*); stems slightly branched, leaves loosely imbricated lanceolate subfalcate secund nerved those of the perichætium similar to the rest. *Hook. in Linn. Trans. v.* 10. *p.* 395. *t.* 31. *f.* 4. *E. Bot. t.* 2507. *Hobs. Br. Mosses, v.* 2. *n.* 2. *Musc. Brit. ed.* 2. *p.* 3. *t.* 8.

Rocks, upon the highest summit of Ben Nevis and the Ptarmigan mountains, and on the Cairngorum range. *Fr.* Spring.—This grows to the greatest size of any of the Genus, and much resembles, in general appearance, *Jungermannia juniperina*. The *foliage* is lax and flaccid, usually pale-coloured; the *nerve* strong and equally present in perichætial leaves as in the others.

2. Phascum. *Linn.* Earth-Moss.

Seta terminal. *Capsule* entire. *Lid* persistent. *Calyptra* dimidiate. (*Musc. Brit. t.* 1.)—Name;—φασκον is an ancient Greek name for some mossy substance; according to Bridel, the *Usnea barbata*.—The species are among the most minute of Mosses, and are more frequent in the southern than the northern parts of Great Britain.

* *Furnished with creeping, branched, conferva-like shoots.*

1. P. *serrátum*, Schreb. (*serrated Earth-Moss*); shoots branched conferva-like, perichætial leaves lanceolate deeply serrated nerveless. *Schreb. de Phasc. t.* 2. *Hedw. Sp. Musc. p.* 23. *E. Bot. t.* 460. *Dicks. Cr. Fasc.* 1. *t.* 1. *f.* 1. *Turn. Musc. Hib. p.* 4. *Musc. Brit. ed.* 2. *p.* 4. *t.* 5.—β. base of the shoots opaque not jointed. *P. stoloniferum, Dicks. Cr. Fasc.* 3. *t.* 7. *f.* 2. *E. Bot. t.* 2006.

Sandy shaded banks, not unfrequent. In the Botanic Garden, Belfast, abundant. *Mr. Drummond.*—*Fr.* Spring.

** *Conferva-like shoots none. Leaves more or less subulate. Capsule nearly sessile.*

2. P. *alternifólium*, Dicks. (*alternate-leaved Earth-Moss*); stems elongated, leaves entire lanceolato-subulate remote, innovations from immediately beneath the fruit. *Dicks. Cr. Fasc.* 1. *t.* 1. *f.* 2. *E. Bot. t.* 107. *Schwaegr. Suppl. v.* 1. *p.* 10. *t.* 10. —*Pleuridium, Brid.*

Moist banks, rare and mostly barren. Epping Forest, *E. Forster, Esq.* Near Liverpool, *Rev. Mr. Taylor.* Pembroke, *Rev. J. S. Tozer.* Belfast, *Mr. Drummond.* Bodorgan, near Aberfraw, Wales; in *fruit* Jan. and Feb. *Mr. W. Wilson.*—A very remarkable moss; perhaps esteemed rarer than it is in reality, on account of its inconspicuous *foliage* and *fruit*. The latter is not always accompanied by the elongated shoots; and the leaves, Mr. Wilson observes, are sometimes broader than represented in the *Musc. Brit.*

3. P. *crispum*, Hedw. (*curly-leaved Earth-Moss*); leaves lanceolato-subulate flexuose crisped when dry. *Hedw. St. Cr. v.* 1. *t.* 9. *Turn. Musc. Hib. p.* 2. *E. Bot. t.* 1680, *and t.* 618. *Musc. Brit. ed.* 2. *p.* 6. *t.* 5.—*P. multicapsulare, Fl. Brit. p.* 1152. *E. Bot. sub t.* 1680.—β. *rostellatum;* beak of

the lid elongated. *P. rostellatum, Brid. Meth. p.* 9. *Bryol. Germ. p.* 58. *t.* 6. *f.* 14.

Banks and fields.—*β.* Northamptonshire. *Rev. M. J. Berkeley. Fr.* March.—The acuter *beak* to the *capsule*, which latter is more exserted, is all the difference I can discover between the *P. rostellatum* and *P. crispum.*

4. P. *subulátum*, Linn. (*awl-leaved Earth-Moss*); leaves subulato-setaceous straight, their nerve disappearing below the summit. *Linn. Sp. Pl. p.* 1570. *Hedw. St. Cr. v.* 1. *t.* 35. *Turn. Musc. Hib. p.* 1. *Fl. Brit. p.* 1149. *E. Bot. t.* 2177. *Drum. Musc. Scot. v.* 1. *n.* 5. *Musc. Brit. ed.* 2. *p.* 6. *t.* 5. —*P. acaule, Dill. Musc. t.* 32. *f.* 10.

Dry banks and fields, frequent. *Fr.* Spring.

5. P. *axilláre*, Dicks. (*lateral-fruited Earth-Moss*); leaves lanceolato-subulate straight their nerve disappearing below the summit, fruit often apparently axillary. *Dicks. Cr. Fasc.* 1. *p.* 2. *t.* 1. *f.* 3. *Turn. Musc. Hib. p.* 1. *Fl. Brit. p.* 1149. *E. Bot. t.* 1036. *Musc. Brit. ed.* 2. *p.* 7. *t.* 5.—*P. nitidum, Hedw. St. Cr. v.* 1. *t.* 34.—*P. strictum, Dicks. Cr. Fasc.* 4. *t.* 10. *f.* 1. *Fl. Brit. p.* 1151. *E. Bot. t.* 2093.

Moist banks. *Fr.* March.—This, like the preceding, which it much resembles, is of a very pale yellowish colour; but it has less setaceous and less rigid *leaves*. From innovations, the *capsules* sometimes appear axillary, and such are generally drooping.

**** Conferva-shoots none. Leaves lanceolate or ovate. Capsules nearly sessile.*

6. P. *crassinérvium*, Schwaegr. (*broad-nerved Earth-Moss*); stemless, leaves erecto-patent linear-lanceolate dentato-serrate, nerve very broad and excurrent. *Schwaegr. Suppl. v.* 1. *p.* 4. *t.* 2. *Bryol. Germ. v.* 1. *p.* 40. *t.* 4. *f.* 3. *Grev. Scot. Cr. Fl. t.* 353.

On limestone soil, in a fallow-field, by the side of Bedford purlieus, near Wansford, Northamptonshire. *Rev. M. J. Berkeley.*—*Fr.* Dec. This has the texture (loosely cellular) and habit of *P. serratum*, but here there are no *conferva-like* shoots, the *leaves* are almost exactly lanceolate and furnished with an exceedingly broad, excurrent *nerve.*

7. P. *pátens*, Hedw. (*spreading Earth-Moss*); stem short, leaves patent narrow-ovate serrated, nerve disappearing below the point. *Hedw. St. Cr. v.* 1. *t.* 10. *Turn. Musc. Hib. p.* 2. *Fl. Brit. p.* 1150. *E. Bot. t.* 1279. *Musc. Brit. ed.* 2. p. 7. *t.* 5. —*β.* leaves narrower. *P. recurvifolium, Dicks. Cr. Fasc.* 4. *t.* 10.—*P. pachycarpon, Schwaegr. Suppl. v.* 1. *p.* 4. *t.* 2.

Clay-fields and banks, not common. *Fr.* Aug.—The patent and strongly serrated *leaves*, with the *nerve* disappearing below the summit, suffice to distinguish this from all the states of *P. cuspidatum.*

8. P. *múticum*, Schreb. (*common dwarf Earth-Moss*); stemless, leaves broadly ovate concave acuminate more or less serrated connivent, nerve reaching to the point. *Schreb. de Phasc. t.* 1. *f.* 11—14. *Turn. Musc. Hib. p.* 3. *Fl. Brit.*

p. 1156. *E. Bot. t.* 2027. *Musc. Brit. ed.* 2. *p.* 8. *t.* 5.—*P. acaulon*, β. *Linn.*—*Dill. Musc. t.* 32. *f.* 12.—β. *minus*, leaves entire.

Moist banks, common.—β. near the sea, Torquay, Devon. *Fr.* Spring. —The innermost *leaves* are sometimes almost hemisphærical, and a tuft of the plant looks like clusters of little bulbs, frequently tinged with brown, and glossy.

9. P. *cuspidátum*, Schreb. (*cuspidate Earth-Moss*); stems sometimes elongated, leaves ovato-acuminate erect entire, nerve reaching to, or beyond, the point. *Musc. Brit. ed.* 2. *p.* 8. t. 5.—α. *apiculatum*, leaves apiculate. *P. cuspid. Schreb. de Phasc. t.* 1. *f.* 1—5. *Turn. Musc. Hib. p.* 3. *Fl. Brit. p.* 1155. *E. Bot. t.* 2025.—*P. Schreberianum, Dicks.*—*Fl. Brit. p.* 1155. *E. Bot. t.* 2026.—*P. curvisetum, Dicks. Cr. Fasc.* 4. *t.* 10. *f.* 4. *Fl. Brit. p.* 1154. *E. Bot. t.* 2259.—*P. Carniolicum*, et *elatium*, *Web. et Mohr.*—*P. acaulon*, α. *Linn.*—β. *piliferum*; leaves hair-pointed. *P. piliferum*, *Schreb. de Phasc. t.* 1. *f.* 6—10. *Fl. Brit. p.* 1151. *E. Bot. t.* 1888.

Hedges, fields, and moist banks. *Fr.* March.—A common but very variable species in the size of the plant, length of the *stems*, more or less apiculated or piliferous foliage, and in the straightness or curvature of the *seta*. For further remarks upon this species, see *Musc. Brit. l. c.*

**** *Conferva-like shoots none. Leaves more or less ovate. Seta elongated.*

10. P. *bryoídes*, Dicks. (*tall Earth-Moss*); stem elongated, leaves ovate apiculate, capsule elliptical. *Dicks. Cr. Fasc.* 4. *t.* 10. *f.* 3. *Fl. Brit. p.* 1154. *E. Bot. t.* 1180. *Musc. Brit. ed.* 2. *p.* 10. *t.* 5.—*P. gymnostomoides, Brid. Meth. p.* 7.

Banks and fields in England, principally in the south, rare. *Fr.* Spring. —Habit of a *Gymnostomum*; but at once distinguished by the elliptical *capsule* and its union with the *lid*. Resembling, too, in miniature, the *Voitia nivalis* from the Carinthian Alps.

11. P. *réctum*, With. (*straight-stalked Earth-Moss*); stem short, leaves ovate with a short point, capsule globose nearly erect. *With. Bot. Arr. ed.* 4. *p.* 771. *t.* 18. *f.* 1. *Turn. Musc. Hib. p.* 4. *Fl. Brit. p.* 1153. *E. Bot. t.* 330. et *p.* 905. *Musc. Brit. ed.* 2. *p.* 10. *t.* 5.

Banks and fields, rare in Scotland, more frequent in England and Ireland. *Fr.* Spring.—This has the habit of *Weissia Starkeana*, with which it frequently grows intermixed, and from which it is known by its globose *capsule*. *Leaves* often reddish. *Capsule* red-brown.

12. P. *curvicóllum*, Hedw. (*crooked-stalked Earth-Moss*); stem short, leaves narrow-ovate acuminated, capsule globose, seta curved. *Hedw. St. Cr. v.* 1. *p.* 11. *E. Bot. t.* 905. (not *t.* 330.)

Moist banks in England. *Fr.* Spring.

Subsect. II. *Lid deciduous. Mouth of the capsule naked.* Gymnostomi.

3. Sphágnum. Linn. Bog-Moss.

Receptacle pedunculated, its peduncle resembling a fruitstalk. *Capsule* sessile on the receptacle, its *lid* deciduous, its *mouth*

naked. *Calyptra* irregularly torn. (*Musc. Brit. t.* 1.)—Name applied by Dillenius to this Genus of Plants. The *Sphagnum* of Pliny is some kind of tree-moss or lichen.—The species are all aquatic and remarkable for the beautiful texture of their leaves and for their pale almost white colour, especially when dry.

1. S. *obtusifólium*, Ehrh. (*blunt-leaved Bog-Moss*); branches tumid, leaves ovate obtuse. *Musc. Brit. p.* 13. *t.* 4.—*α. vulgaris*, stems loosely tufted, 7 or 8 inches long, leaves closely imbricated. *Ehrh. Cr. n.* 241. (*according to Sm.*) *Drum. Musc. Scot. v.* 1. *n.* 3.—*S. latifolium, Hedw. Sp. Musc. p.* 27. *Turn. Musc. Hib. p.* 5. *Fl. Brit. p.* 1145. *E. Bot. t.* 1405.—*S. cymbifolium, Sw.* (to which may be added probably *S. contortum, Schultz*, and *S. subsecundum, Nees;* and many species of Bridel.) —*S. palustre, α. Linn.—Dill. Musc. t.* 32. *f.* 1.—*β. minus*, stems densely tufted 2 or 3 inches long, leaves closely imbricated. *S. compactum, Schwaegr. Suppl. v.* 1. *t.* 3. *Bryol. Germ. v.* 1. *p.* 13. *t.* 2. *f.* 5. (excellent).—*γ. fluitans*, stems much lengthened out, 2 to 3 feet long slender, leaves scattered remote. *S. latifolium, β. fluitans, Turn. Musc. Hib. p.* 6.—*S. immersum, Bryol. Germ. v.* 1. *p.* 11. *t.* 2. *f.* 4.

Bogs and still pools, in heaths and moory soils, every where most abundant. *Fr.* Spring.—Linnæus was perhaps correct in supposing that there was but one species of *Sphagnum:* for I think that from the *var. α.* of *S. obtusifolium*, the most decidedly marked of the broad-leaved state of the Genus, a regular gradation may be traced to *S. cuspidatum*, which has the longest and narrowest leaves. It is very certain that the limits of the species, if such they may be called, cannot be defined. Bridel enumerates 16 species.

2. S. *squarrósum*, Web. et Mohr. (*spreading leaved Bog-Moss*); branches attenuated at the extremities, leaves ovato-acuminate squarrose recurved. *Web. et Mohr, It. Suec. t.* 2. *f.* 1. a. b. *E. Bot. t.* 1498. *Drum. Musc. Scot. v.* 2. *n.* 4. *Musc. Brit. ed.* 2. *p.* 13. *t.* 4.

Bogs; not rare. *Fr.* June.—Separated from the last on account of its more acuminated, and, at the extremities, recurved *leaves*.

3. S. *acutifólium*, Ehrh. (*slender Bog-Moss*); branches attenuated, leaves ovato-lanceolate crowded. *Ehrh. Cr. n.* 72. (*Sm.*) *Schwaegr. Suppl. v.* 1. *p.* 15. *t.* 5. *Drum. Musc. Scot. v.* 1. *n.* 1. *Musc. Brit. ed.* 2. *p.* 14. *t.* 4.—*S. capillifolium, Hedw. Sp. Musc. p.* 28. *Fl. Brit. p.* 1146. *E. Bot. t.* 1406.—*S. palustre, β. Linn.—Dill. Musc. t.* 32. *f.* 2. A.

Bogs; extremely common. *Fr.* Spring.

4. S. *cuspidátum*, Ehrh. (*long-leaved floating Bog-Moss*); branches attenuated, leaves lanceolato-subulate lax. *Ehrh. Cr. n.* 25. (*Sm.*) *Fl. Brit. p.* 1147. *E. Bot. t.* 2392. *Schwaegr. Suppl. v.* 1. *p.* 16. *t.* 6. *Turn. Musc. Hib. p.* 6. *Drum. Musc. Scot. v.* 1. *n.* 2. *Musc. Brit. ed.* 2. *p.* 15. *t.* 4.

Bogs, not uncommon, generally wholly immersed in the water; rare in fruit. *Fr.* Spring.—Dr. Greville has found, near Edinburgh, a state of this plant four feet long, with leaves 3-4ths of an inch in length, but always barren.

4. Œdipódium. *Schwaegr.* Club-stalked Moss.

Seta terminal, elongated, thick, fleshy. *Mouth* of the *capsule* without peristome, but closely shut by an horizontal *membrane*. *Calyptra* dimidiato-mitriform.—Named from οἰδος, a *swelling*, and πους, a *foot*; the foot-stalk being remarkably thickened upwards.

1. Œ. *Griffithiánum*, Schwaegr. (*Griffithian club-stalked Moss*). *Schwaegr. Suppl.* 2. *p.* 15. *t.* 150. *Brid. Bryol. Univ. v.* 2. *p.* 83.—*Gymnostomum Griffithianum*, *Fl. Brit. p.* 1162. *E. Bot. t.* 1938. *Drum. Musc. Scot. v.* 1. *n.* 9. *Musc. Brit. ed.* 2. *p.* 20. *t.* 7.—*Bryum Griffithianum*, *Dicks. Cr. Fasc.* 4. *t.* 10. *f.* 10.—*Splachnum Frœlichianum*, *With.* et *Hull.* (Sm.)

Crevices of rocks upon the more elevated mountains. Snowdon, *Mr. Griffith*, *Mr. W. Wilson*. Ingleborough, Yorkshire, *Rev. J. Dalton* and *W. J. H.* Clova mountains, *Mr. Don* and *Mr. Drummond*. Ben-Nevis and Ben-Cruachan, *Rev. Colin Smith*. Ben-Ledi, *Mr. J. D. Hooker* and *Mr. G. Lyon*. *Fr.* Aug.—*Stems* scarcely any. *Leaves* large, roundish-obovate, strongly reticulated, succulent, the *nerve* disappearing below the summit. *Seta* very thick and fleshy, especially upwards, where it gradually enlarges into the oval nearly erect *capsule*. *Lid* hemisphærical. *Calyptra* diaphanous in its lower half. *Gemmæ* are found within the leaves, "obovate, compressed, with lenticular edges, sometimes intermixed with the pistils, sometimes with the anthers and jointed filaments; when fully formed they have lenticular edges and are supported on long jointed filiform stalks. Before they are detached they exhibit lateral innovations from their edges. The *membrane* which closes the mouth of the capsule is continued, so as to line the *lid*, which lining is detached along with the lid, adhering by means of connecting threads at intervals, and leaving a space between it and the fleshy substance of the lid, which is almost pellucid. *Columella* only ½ as long as the capsule. *Seeds* in fours." *W. Wilson*.

So remarkable a plant as this, with a splachnoid habit, does not rank well with the *Gymnostoma*. I have therefore followed Schwaegrichen, in separating it, making the essential difference to depend on the peculiar nature of the fruitstalk.

5. Gymnóstomum. *Hedw.* Beardless-Moss.

Seta terminal, slender, rigid. *Mouth* of the *capsule* naked, or at most, in an early stage, closed with a more or less complete, horizontal *membrane*. *Calyptra* dimidiate.—Leaves *inserted on all sides of the stem*. (*Musc. Brit. t.* 1.)—Name; γυμνος, *naked*, and στομα, the *mouth*: from the absence of a peristome.

* *Stems more or less elongated, branched.*

1. G. *cæspitítium*, Web. et Mohr, (*minute-tufted Beardless-Moss*); leaves lanceolato-subulate canaliculate obscurely nerved very straight even when dry, those of the perichætium much longer than the turbinate quite furrowless capsule. *Web. et Mohr*,

Cr. Germ. p. 77. *and* 453.—*Anictangium cæspititium, Hedw. Suppl. v.* 1. *p.* 35. *t.* 12.—*Schistidium cæspititium, Brid.—Bryol. Germ. p.* 94. *t.* 8. *f.* 2.

Crevices of rocks, near the highest summit of Ben-Lawers, with *Saxifraga cernua* and *Verrucaria Hookeri. Fr.* July.—This very distinct Moss I had the good fortune to discover, whilst on a botanizing excursion with the students of my class in the summer of 1830. It grew in tufts, so dense that the moss would have passed unnoticed by me, were it not for its glossy *capsules*, nestling among the leaves. The colour is brownish green. *Stems* branched, half an inch long. *Leaves* decidedly nerved, even the perichætial ones, though these are less evidently so. *Lid* obliquely rostrate. *Calyptra* dimidiate, whence the plant should certainly be retained in *Gymnostomum*. *Seta* about as long as the capsule, shorter than the perichætial leaves. (*G. æstivum*, arranged here in the *Muscologia Britannica*, I have, at the suggestion of Mr. Wilson, removed to *Hedwigia*).

2. G. *lappónicum*, Hedw. (*Lapland Beardless-Moss*); leaves linear-lanceolate channelled on the upper side along the pellucid nerve crisped when dry, those of the perichætium broadly ovate convolute, capsule subexserted turbinate furrowed. *Hedw. St. Cr. v.* 3, *p.* 5. A. *Fl. Brit. p.* 1167. *E. Bot. t.* 2216. *Drum. Musc. Scot. v.* 1. *n.* 7. *Musc. Brit. ed.* 2. *p.* 17. *t.* 6.—*Anictangium, Hedw. Sp.—Bryum, Dicks.*

In the crevices of rocks, on Snowdon, and abundant on the summits of the high mountains of Scotland. *Fr.* July. — This is a very beautiful and well marked species, when bearing fruit upon the higher Alps, rarely exceeding an inch or an inch and a half in length ; but when growing in warmer and moister situations it is 3—5 inches long and is always barren.

3. G. *viridíssimum*, Sm. (*green tufted Beardless-Moss*); leaves broadly lanceolate patent dotted, capsule ovate furrowed when old, lid obliquely rostrate. *E. Bot. t.* 1583. *Musc. Brit. ed.* 2. *p.* 18. *t.* 6.—*Dicranum viridiss., Fl. Brit. p.* 1224. *Turn. Musc. Hib. p.* 71.—*Grimmia Forsteri, Fl. Brit. p.* 1196. *E. Bot. t.* 2225.—*Bryum Forsteri, Dicks. Cr. Fasc.* 3. *t.* 7. *f.* 8. —β. leaves reflexed when moist.

On trunks of trees, seldom on rocks, in the south of England and Ireland : rare in the north and in Scotland. *Fr.* Spring. — Densely pulvinate : in its foliage almost exactly resembling *Zygodon conoideum*. *Mr. Wilson* finds it on trees at Mucruss near Killarney, bearing fruit, and the *Rev. Colin Smith* at Inverary, growing with the latter plant.

4. G. *curviróstrum*, Hedw. (*curve-beaked Beardless-Moss*); leaves lanceolate-subulate erect rigid straight when dry, capsule (brown) broadly ovate, lid obliquely rostrate longer than the capsule. *Hedw. St. Cr. v.* 2. *t.* 24. *Fl. Brit. p.* 1164. *E. Bot. t.* 2214. *Drum. Musc. Scot. v.* 1. *n.* 8. *Musc. Brit. ed.* 2. *p.* 19. *t.* 6.—*G. stelligerum, Schrad.?—Fl. Brit. p.* 1164.—*G. luteolum, Fl. Brit. p.* 1163. (not of *E. Bot.*)—*G. pomiforme, Bryol. Germ. v.* 1. *p.* 158. *t.* 10. *f.* 18.—*Bryum æstivum, Linn.—B. stelligerum, Dicks.*

Moist rocks. Ecclesmahon Burn, Linlithgowshire, *Mr. Arnott.* Near

Gainsford, Yorkshire, *Mr. Backhouse.* Rocks at Fairhead, Ireland. *Mr. Templeton. Fr.* Summer.

5. G. *rupéstre,* Schwaegr. (*tufted rock Beardless-Moss*); leaves linear-subulate patent flaccid flexuose twisted when dry, capsule (pale) ovate, lid conico-rostrate shorter than the capsule. *Schwaegr. Suppl. v.* 1. *p.* 31. *t.* 10. *Drum. Musc. Scot. v.* 2. *n.* 6. *Musc. Brit. ed.* 2. *p.* 19. *Suppl. t. ii.*—*G. curvirostrum, Hobs. Br. Mosses, v.* 1. *n.* 9.—*G. æruginosum, Fl. Brit. p.* 1163. *E. Bot. t.* 2200.—*G. articulatum, Brid.*—*Bryol. Germ. v.* 1. *p.* 156. *t.* 10. *f.* 17 ?—*G. stelligerum, Bryol. Germ. v.* 1. *p.* 168. *t.* 11. *f.* 23. (Arnott.)

Moist dripping rocks, not uncommon. *Fr.* Autumn.—I am happy to learn that *Mr. Wilson,* who has gathered this and the preceding *Gymnostomum* in Wales, considers them to be truly distinct. The present is, however, by far the most common.

** *Stems short, scarcely branched.*

6. G. *ovátum,* Hedw. (*hairy-leaved Beardless-Moss*); leaves ovate erect concave piliferous, nerve expanded into a gemmiferous membrane, lid rostrate. *Musc. Brit. ed.* 2. *p.* 21. *t.* 7.—*α. vulgare;* capsule ovate. *Hedw. St. Cr. v.* 1. *f.* 6. *Fl. Brit. p.* 1160. *E. Bot. t.* 1889. *Turn. Musc. Hib. p.* 9. *Drum. Musc. v.* 2. *n.* 8.—*β. gracile;* capsule oblong.

Banks and walls. *Fr.* Feb.—This species varies considerably in the length of its *capsules,* hence I have constituted 2 *vars.* In all states, the *nerve* is expanded into a membrane on each side from above the middle to the apex of the leaf: but Mr. Wilson observes that gemmæ are not always attached to it.

7. G. *truncátulum,* Hoffm. (*little blunt-fruited Beardless-Moss*); leaves oblongo-obovate acute apiculate patent reticulated pellucid entire nearly plane their margins recurved, capsule ovate or turbinate, lid obliquely rostrate. *Musc. Brit. ed.* 2. *p.* 22. *t.* 7.—*α.* capsule turbinate. *G. truncatulum, Hoffm. Germ. v.* 2. *p.* 27. *Turn. Musc. Hib. p.* 7. *Fl. Brit. p.* 1158. *E. Bot. t.* 1975. *Drum. Musc. Scot. v.* 1. *n.* 12. *Musc. Brit. ed.* 2. *p.* 22. *t.* 7.—*G. truncatum, Hedw. St. Cr. v.* 1. *t.* 5.—*Bryum truncatulum, Linn.*—*β.* capsule ovate or oblong. *G. intermedium, Turn. Musc. Hib. p.* 7. *t.* 1. *f. a. Fl. Brit. p.* 1159. *E. Bot. t.* 1976.—*G. rufescens. Brid.*—*Bryol. Germ. v.* 1. *p.* 121. *t.* 9. *f.* 1.—*Bryum truncatulum, Linn.*—*Dill. Musc. t.* 45. *f.* 7. A—E.

On banks, walls, and fallow-fields. *Fr.* Winter.—*Mr. Lyell* and *Dr. Greville* find this occasionally with the *stem* branched in a fasciculated manner, with 6—8 branches, each branch bearing a *capsule.*

8. G. *Wilsóni,* Hook. (*Wilsonian Beardless-Moss*); leaves oblongo-obovate obtuse apiculate minutely reticulated opaque entire, the margin slightly recurved, capsule oblongo-elliptical a little contracted at the mouth, lid obliquely rostrate, calyptra scabrous above. *Hook. Bot. Misc. v.* 1. *p.* 143. *t.* 41.—*G. affine, Wilson, MSS.* (not *Nees et Hornsch.*)

Near Over, Cheshire, *Mr. W. Wilson*, also near Bangor, and in Anglesea; near Forfar, Scotland, *Mr. T. Drummond;* growing in fields. *Fr.* Feb. — Nearly allied to the last, but when the two are compared, they will be found truly distinct.

9. G. *Heímii*, Hedw. (*long-stalked Beardless-Moss*); leaves lanceolate serrated at the point, lid obliquely rostrate. *Hedw. St. Cr. v.* 1. *t.* 30. *Turn. Musc. Hib. p.* 9. *Fl. Brit. p.* 1162. *Drum. Musc. Scot. v.* 2. *n.* 12.—*G. obtusum, Hedw. Sp. Musc. t.* 2. *t.* 1—3. *Turn. Musc. Hib. p.* 9. *Fl. Brit. p.* 1159. *E. Bot. t.* 1407.—*G. intermedium, Schwaegr. Suppl. v.* 1. *p.* 19. *t.* 7. (not of others.)—*G. affine, Bryol. Germ. v.* 1. *p.* 140. *t.* 9. *f.* 9.

Moist banks and pastures, especially near the sea. *Fr.* Spring. — This is of stouter and larger growth than the preceding; the *leaves* are more rigid, narrow, serrated at the extremity and frequently assume a reddish tinge, their margins attenuated, plane, not recurved.

10. G. *cónicum*, Schwaegr. (*blunt-lidded Beardless-Moss*); leaves oblongo-ovate apiculate spreading, capsule more or less ovate, lid conical. *Musc. Brit. ed.* 2. *p.* 23. *t.* 7.—*α.* capsule ovate. *G. conicum, Schwaegr. Suppl. v.* 1. *p.* 26. *t.* 9. *Bryol. Germ. v.* 1. *p.* 127. *t.* 9. *f.* 4.—*β.* capsule turbinate. *G. minutulum, Schwaegr. Suppl. v.* 1. *p.* 25. *t.* 9. *Bryol. Germ. v.* 1. *p.* 123. *t.* 9. *f.* 2.

Fields, near Cork, *Mr. J. Drummond.* Too frequent in the Bot. Garden, Dublin, *Mr. J. T. Mackay.* Banks near the sea, Dunleary, Ireland, *Mr. T. Drummond.* Ringway, Cheshire; and Aberffraw, Wales, *Mr. W. Wilson.* Near Cambridge, *Rev. Prof. Henslow. Fr.* Feb. — Often growing with *G. truncatulum, Phascum rectum*, and *Weissia Starkeana;* yet retaining all its characters: and, besides the above-mentioned differences, Mr. Wilson observes that the *leaves* are strongly recurved at the margin, and the *nerve* is slightly thickened upwards.

11. G. *fasciculáre*, Hedw. (*blunt pear-shaped Beardless-Moss*); leaves oblongo-acuminate nearly plane subserrated margined, capsule pyriform, lid plane submammillate. *Hedw. Sp. Musc. t.* 4. *f.* 5—9 (bad). *Turn. Musc. Hib. t.* 10. *Fl. Brit. p.* 1165. *E. Bot. t.* 1245. *Drum. Musc. Scot. v.* 2. *n.* 9. *Musc. Brit. ed.* 2. *p.* 23. *t.* 7.— *Hyssopus Salomonis*, of Hasselquist, according to Smith.

Moist banks. *Fr.* Spring. — The *leaf* has a more prominent *nerve* than the following species (which in habit it resembles), always with a deep red tinge, of which the whole of the foliage and the fruitstalk partake. The mouth of the *capsule* and margin of the lid is coloured red, and the mouth is in proportion wider. *Capsule* quite smooth. *W.*

12. G. *pyriférme*, Hedw. (*sharp pear-shaped Beardless-Moss*); leaves ovato-acuminate concave serrated not margined, capsule roundish-obovate, lid convex shortly rostrate. *Hedw. Sp. Musc. p.* 38. *Turn. Musc. Hib. p.* 11. *Fl. Brit. p.* 1166. *E. Bot. t.* 413. *Drum. Musc. Scot. v.* 1. *n.* 11. *Musc. Brit. ed.* 2. *p.* 24. *t.* 7.—*Bryum pyriforme, Linn.*—*Dill. Musc. t.* 44. *f.* 6.

Wet banks and ditches; frequent. *Fr.* Spring. — Stouter and paler coloured than the last. "It is remarkable for having a considerable

space between the outer coat of the capsule and the proper membrane enclosing the seeds. The inner membrane (or seminal bag) is attached by numerous threads or veins to the inside of the outer covering, and from the base proceeds a bundle of filaments, forming in appearance a pillar, but really serving as a cable to keep the theca steady. As the theca enlarges in its progress towards maturity, the lateral threads which, at first, are straight and tight, become lax, and the bundle of threads at the base likewise: — the inner surface of the outer covering is overspread with anastomosing veins of a spongy lax texture, not very firmly attached. — This appearance does not occur in *G. fasciculare;* as the theca does, from the first, almost fill the cavity formed by the outer skin, though a very short bundle of vessels is sometimes visible at the base." *W.*

13. G. *ténue*, (*few-leaved Beardless-Moss*); stems scarcely any, leaves linear-lanceolate entire erect obtuse short with a strong nerve disappearing below the summit, the upper or perichætial ones much elongated and with an obscure nerve, capsule oblong, lid acuminated. *Hedw. Sp. Musc. t.* 4. *f.* 1—4. *Drum. Musc. Scot. v.* 2. *n.* 11. *Musc. Brit. ed.* 2. *p.* 24. *t.* 7. — *G. paucifolium, E. Bot. t.* 2506. — *Dicranum cylindricum, Fl. Brit. p.* 1221. — *Bryum paucifolium, Dicks. Cr. Fasc.* 4. *t.* 11. *f.* 3.

On walls and sandstone rocks; but rare. *Mr. W. Wilson* has lately detected it on the walls at Timperley, Cheshire, and *Mr. T. Drummond* on red sandstone near Belfast. *Fr.* June.

14. G. *Doniánum*, Sm. (*Donian Beardless-Moss*); stem scarcely any, leaves subulate, capsule turbinate, lid hemisphærical with an acuminated point. *E. Bot. t.* 1582. *Drum. Musc. Scot. v.* 2. *n.* 10. *Musc. Brit. ed.* 2. *p.* 25. *t.* 7.

Sandstone rocks, Scotland. Den of Dupplin, *Mr. G. Don.* Den of Airly and at Norran water, *Mr. T. Drummond.* Cawsey Dene, near Newcastle; and limestone rocks, High Force of Tees, *R. B. Bowman, Esq.* Argyleshire, *Rev. Colin Smith. Fr.* Nov. — A most minute and delicate moss; forming a stratum upon the surface of the sandstone rocks, in the few places where it has been found. *Capsule* exactly turbinate, pale.

15. G. *micróstomum*, Hedw. (*small-mouthed Beardless-Moss*); leaves broadly subulate, their margins involute above the middle flexuose crisped when dry, capsule elliptical contracted at the mouth, lid subulate incurved. *Hedw. St. Cr. v.* 3. *t.* 30. *Fl. Brit. p.* 1165. *E. Bot. t.* 2215. *Drum. Musc. Scot. v.* 1. *n.* 10. *Musc. Brit. ed.* 2. *p.* 25. — *G. rutilans, Hedw. Sp. Musc. t.* 3. *f.* 8—11. — *Hymenostomum microstomum, Br. in Linn. Trans. v.* 12. *p.* 572. *Bryol. Germ. p.* 199. *t.* 12. *f.* 4. to which we think may safely be added, of the last-mentioned work, *H. rutilans, l. c. t.* 12. *f.* 5., *H. brachycarpum, t.* 12. *f.* 3., *H. squarrosum, t.* 12. *f.* 1., *H. obliquum, t.* 12. *f.* 2., *H. subglobosum, t.* 12. *f.* 6., and *H. crispatum, t.* 12. *f.* 7.

Banks, not unfrequent, especially in subalpine countries. *Fr.* April. — Every one who has gathered this plant, must have been aware of the difficulty, I might almost say impossibility, of distinguishing it from *Weissia controversa,* except by a minute examination of the *mouth* of the

capsule; and then the presence of a white horizontal *membranous ring*[1] at the contracted mouth of the capsule, and the absence of the teeth, will decide its character. Now, *Mr. W. Wilson* has made a most interesting discovery, and which perhaps will tend to clear up existing doubts, respecting other genera of Mosses. After various observations made in three different years, which tended to the same result, *Mr. Wilson* writes from Camyneunt, near Aber, N. Wales, 26th March, 1830:—"I find here constant traces of a *peristome*, requiring a high magnifier to distinguish from the membranous border of the *Gymnostoma*, but assuming sometimes the usual appearance of the small state of *Weissia controversa*, of which I am inclined to think it is a mere variety. Specimens from Nant Frangon, gathered March 4th, 1830, have a deficient peristome in the smaller capsules and most evident red teeth in other cases." This goes far towards confirming an opinion I formerly expressed, that the *Ptychostomum* of authors was a *Bryum*, with a deficient inner peristome.[2] *Leptostomum*, I have shown to have sometimes a very near approach to teeth in the membrane at the mouth of the capsule.[3] Hedwig's *Bryum macrocarpum* has a peristome of the same kind. The *Splachnum paradoxum* of Br. (*S. Adamsianum? Hornsch.*) is destitute of peristome. Mr. Wilson has proved that there is an imperfect inner peristome to *Weissia* (*Entosthodon*) *Templetoni*, so that it can hardly be distinguished from *Funaria*. Other mosses will probably be found to be subject to similar variations: and thus a new light will be thrown upon the real nature of established species and genera.

6. ANICTÁNGIUM. *Hedw.* Branched-Beardless-Moss.

Seta terminal. *Mouth* of the *capsule* naked. *Calyptra* mitriform. (*Musc. Brit. t.* 1.)—Name,—*ανοικτος, open*, and *αγγειον*, a *vessel* or *capsule*, from the expanded mouth of the latter.—This genus is distinguished from *Gymnostomum* by its mitriform calyptra, as *Hedwigia* is by its lateral fruitstalks. Hence, the latter will be found among the *Pleurocarpi.*

1. A. *ciliátum*, Hedw. (*hoary Branched-Beardless-Moss*); leaves subsecund ovate concave distinctly dotted not striated, the margins below recurved above plane acuminated and more or less diaphanous at the point, those of the perichætium toothed or serrated at the extremity, capsule sessile turbinate, lid plane subumbonate.—*α. vulgare;* all the leaves diaphanous at the point, those of the perichætium laciniated. *A. ciliatum, Hedw. Sp. Musc. p.* 40. *Turn. Musc. Hib. p.* 11. *Drum. Musc. Scot. v.* 1. *n.* 13. *Musc. Brit. ed.* 2. *p.* 27. *t.* 6.—*Hedwigia ciliata, Hedw. St. Cr. v.* 1. *t.* 40.—*Schistidium ciliatum, Brid.*—*Bryol. Germ. v.* 1. *p.* 101. *t.* 8. *f.* 5.—*Gymnostomum ciliatum, Swartz.*—*Fl. Brit. p.* 1168. *E. Bot. t.* 1179.—*Bryum ciliatum, Dicks.*—*Bryum apocarpum, β. Linn. Sp. Pl. p.* 1579. *Dill. Musc. t.* 32. *f.* 5.—*β. imberbe;* stem-leaves coloured at the points, those of the perichætium diaphanous and serrated. *A. ciliatum, γ. rufescens, Arn. Disp. Musc. p.* 11.—*A. imberbe, Musc. Brit. ed.* 2.

[1] Common indeed to many *Gymnostoma.*

[2] Appendix to Captain Parry's Attempt to reach the North Pole, p. 215.

[3] See *Gymnostomum Leptostomum, Musci Exot. t.* 169.

p. 27. *t.* 6.—*Gymnostomum imberbe*, *E. Bot. t.* 2237.—*Schistidium imberbe*, *Bryol. Germ. v.* 1. *p.* 99. *t.* 8. *f.* 4.

Rocks and stones, frequent.—*β.* Mountains in the South of Ireland, *Miss Hutchins. Fr.* March.

2. A. *striátum*, Wils. MSS. (*green Branched-Beardless-Moss*); leaves ovate concave very obscurely cellular striated the margins below reflexed, above distinctly recurved shortly acuminated more or less diaphanous at the point, those of the perichætium toothed or serrated at the extremity, seta as long as the globose capsule, lid rostrate.—*α. subincanum;* leaves decidedly striated tipped with diaphanous points.—*β. unicolor;* all the leaves coloured at the points scarcely striated.

Rocks near Llyn Idwel, Caernarvonshire. Apr. 1829. and *β.*, Glengariff, Ireland, *Mr. W. Wilson. Fr.* Nov.—Mr. Wilson considers the difference in the leaves of this plant, as sufficient alone to keep it distinct from the preceding. These differences (except what concerns the striæ) he finds to be constant, though certainly minute.

7. Schistóstega. *Mohr.* Schistostega.

Seta terminal. *Mouth* of the *capsule* naked. *Lid* very thick, with radiating cells (especially when seen from beneath). *Calyptra* campanulate, at length often cleft.—Leaves *bifarious.* (*Musc. Brit. t.* 1.)—Name, σχιστος, *cleft*, and στεγη, the *lid*, from an idea that the lid eventually became cleft or split.

1. S. *pennáta*, Hook. et Taylor, (*pennated Schistostega*). *Musc. Brit. ed.* 1.—*ed.* 2. *p.* 30. *t.* 8.—*S. osmundacea*, *Mohr.*—*Gymnostomum pennatum*, *Hedw. St. Cr. v.* 1. *t.* 29.—*G. osmundaceum*, *Fl. Brit. p.* 1161. *E. Bot. t.* 2213.—*Mnium osmundaceum*, *Dicks. Cr. Fasc.* 1. *t.* 1. *f.* 4.

Moist banks in several parts of Devonshire: especially in the south of that county, *Rev. J. S. Tozer.* First discovered by *Mr. Newberry* in the road from Zele to S. Taunton church, near Oakhampton. At Tildersley and Worsley, Lancashire, *Mr. W. Evans* (formerly President of the Tildersley Bot. Society, and a correspondent of the late Dr. Withering); whence also specimens have been communicated to Mr. W. Wilson by *Mr. John Martin*, a zealous and accurate Botanist of Tildersley. Roofs of the sandstone caverns, just beyond the Jews' burying-ground on the west side of the Gallows Hill in Nottingham forest, *Mr. T. Jowitt.* Entrance of a subterranean Gallery in Rowter rock near Winster, Derbyshire, *J. E. Bowman, Esq. Fr.* Spring.—This curious and delicate little moss has a good deal the habit of the *Fissidens* groupe of the *Dicrana*. *Stems* reddish, scarcely half an inch long, extremely slender. *Leaves* pinnated, decurrent, lanceolate, entire, with very lax reticulations. *Capsule* exceedingly small, sphærical, pale brown. Since the publication of the remarks on the lid of this plant, in the 2d edition of Muscologia Britannica, Mr. Bowman and Mr. W. Wilson examined living specimens together, but were quite unable to find any trace of radiating fissures in the lid (as described by Hedwig), either before or after it had been dried. The latter gentleman has subsequently remarked to me: "the *operculum* is the very thickest and the most sturdy that I ever met with in any Moss, filling up the mouth exactly like a bung, composed strictly of cells of an hexagonal form pervading the thickness of the lid, and not unfrequently disposed so as to

stand in rows from the centre to the circumference, so that when any part of the lid is *obliquely* placed, with respect to the eye, the partitions of the cells, in perspective, represent dark lines resembling radii; and this appearance is so constant when the lower or *concave* side of the lid is uppermost, in every part but that which may happen to be turned at right-angles to the line of sight, that it is no wonder that Hedwig and others believed in a fissile lid. The top of the columella always adheres to the lid, and it is not easy to remove it. I made several longitudinal sections in order to ascertain the texture of the lid, and always found it to consist of the spongy body lining the concavity, and, on its removal, an arch of pyramidal cells extending quite through the lid, without interruption, thus proving the non-existence of a peristome.— These sections were allowed to dry under the microscope, and in an instant the spongy portion of the columella shrunk up and disappeared, the diameter of the lid became very much less: the concave side became plane, and the upper or convex one was increased in convexity; the thickness not visibly altered, except so far as the spongy lining was in question. On the application of water the original shape was restored. I may add that when the *Schistostega* is in its infancy, it resembles a *conferva* with globular articulations:—in this state it constitutes the "*shining moss*," or "*golden-green light*," described by Mr. Bowman in the Mag. of Nat. Hist. (v. 3. p. 462.). Of this fact I am well assured, having carefully examined young *half-developed* plants possessing confervoid branches. connected with the base of the stem."

Subsect. III. *Lid deciduous. Mouth of the capsule furnished with a peristome.* Peristomi.[1]

Div. I. *Peristome single.* Aploperistomi.[2]

8. Diphýscium. *Mohr.* Diphyscium.

Seta terminal. *Capsule* gibbous. *Peristome* single, forming a plicate membranous truncated cone. *Calyptra* mitriform. (*Musc. Brit. t.* 1.).— Name, δις, *twice*, or *two-fold*, and φυσκη, a *bladder*, from the double membrane of which the capsule is composed. To me this appears to be with great justice separated from *Buxbaumia* by Mohr: and differing as it does in its foliage, as well as peristome, from that Genus, I cannot but be surprised that Schwaegrichen, in his *Sp. Musc. Frondosorum*, should have united them.

1. D. *foliósum*, Mohr, (*leafy Diphyscium*). *Mohr, Obs. Bot. p.* 34. *Hook. in Fl. Lond. N. S. cum Ic. Drum. Musc. Scot. v.* 1. *n.* 6.—*Buxbaumia foliosa, Linn. Syst. Veget. p.* 945. *Fl. Brit. p.* 1148. *E. Bot. t.* 329. *Dill. Musc. t.* 32. *f.* 13.

Woods, on banks and wall-tops, in alpine situations. *Fr.* Summer.— A minute *plant*, densely tufted. *Stems* none. *Leaves* small, ligulate and entire, dark-green, opaque, furnished with a strong *nerve*. *Fructification* large in proportion to the size of the plant, enveloped by the perichætial leaves, which are lanceolato-oblong, membranaceous, acuminated, jagged at the extremity, having a strong, rigid, brown, excurrent *nerve*. *Capsule* nearly sessile, ovate, oblique, gibbous. *Calyptra* mitriform. *Lid* conical, acuminated.

[1] περι, *around*, and στομα, the *mouth*.

[2] απλοος, *single*, combined with the word *peristomi*.

9. TÉTRAPHIS. *Hedw.* Tetraphis.

Seta terminal. *Peristome* single, of four equidistant, erect *teeth*. *Calyptra* mitriform, furrowed. (*Musc. Brit. ed.* 2. *p.* 32. *t.* 1.).—Named from τετρα, and probably φαλος, in allusion to the four teeth or prominences at the mouth of the capsule.

1. T. *pellúcida*, Hedw. (*pellucid Tetraphis*); stems elongated, leaves ovate acuminated, those of the perichætium lanceolate, capsule cylindrical. *Hedw. Sp. Musc. t.* 7. *f.* 1. *E. Bot. t.* 1020. *Hook. in Fl. Lond. N. S. cum Ic. Musc. Brit. p.* 33. *t.* 8.

Generally found on decaying trunks of trees, sometimes on the ground, and mostly in hilly or subalpine countries. *Fr.* Spring.—*Plant* of a pale yellow-green colour and rigid habit, the roots densely tufted. Besides the male and female fructification (usually so called), there are plants terminated by cup-shaped *receptacles*, consisting of broadly-obcordate *leaves*, in the centre of which are fixed by a short foot-stalk small spherical bodies, exactly resembling the anthers of a *Jungermannia*.

2. T. *Browniána*, Grev. (*Mr. Brown's Tetraphis*); stems very short, leaves few linear slightly incrassated upwards, those of the perichætium ovate obtuse, capsule ovate. *Grev. Fl. Edin. p.* 230. *Scot. Cr. Fl. t.* 169. *Drum. Musc. Scot. v.* 2. *n.* 13. *Musc. Brit. ed.* 2. *p.* 33. *t.* 8.—*T. ovata, Musc. Brit. ed.* 1. *Hook. Fl. Lond. N. S. cum Ic.*—*Tetrodontium Brownianum, Schwaegr. Suppl. v.* 2. *t.* 129.—*Bryum Brownianum, Dicks. Cr. Fasc.* 4. *t.* 10. *f.* 16.—*Orthotrichum Brownianum, Fl. Brit. p.* 1269.—*Grimmia Browniana, E. Bot. t.* 1422.

Rocks, particularly of sandstone, in several parts of England, Scotland, and Ireland. *Fr.* Spring.—A minute moss, of a rigid habit and deep-brown colour, differing indeed in habit from the preceding, as well as in its place of growth. The *T. ovata* of Hoppe is supposed by some to be the same species as the present, which, when growing on granite, is occasionally seen without the linear leaves.

10. SPLÁCHNUM. *Linn.* Splachnum.

Seta terminal. *Peristome* single, of 8 double or sometimes 16 geminate *teeth* mostly reflexed when dry. *Capsule* with an evident apophysis. *Calyptra* mitriform, at length subdimidiate, glabrous, without furrows. (*Musc. Brit. t.* 1.)—Named from the Greek Σπλαγχνον, of Dioscorides, applied to some Lichen or other Cryptogamic plant.—This is a genus, no less elegant in the form and colour, than remarkable for the places of growth of the greater number of its species, namely on the dung of animals or on other animal substance, as bones, decayed woollen stockings, and hats.

* *Leaves acuminate.*

1. S. *sphæ'ricum*, Linn. fil. (*globe-fruited Splachnum*); leaves obovato-rotundate acuminate slightly serrated, apophysis ovato-globose wider than the capsule. *Linn. fil. Meth. Musc. t.* 1. *f.* 1.

Hedw. St. Cr. v. 2. *t.* 16. *Fl. Brit. p.* 1174. *E. Bot. t.* 785. *Drum. Musc. Scot. v.* 2. *n.* 14. *Musc. Brit. ed.* 2. *p.* 36. *t.* 9.— *S. gracile, Dicks. Cr. Fasc.* 4. *t.* 10. *f.* 5. *Fl. Brit. p.* 1174. *Schwaegr. Suppl. v.* 1. *p.* 52. t. 15.— *S. ovatum, Hedw. Sp. Musc. p.* 54. *t.* 8. *f.* 4—6. *Turn. Musc. Hib. p.* 15. *Fl. Brit. p.* 1172. *E. Bot. t.* 1590.— *S. rugosum, Dicks.* (not *E. Bot.?*)

On the dung of animals, in subalpine countries, very abundant. *Fr.* Summer.—A variable species in the length of the *stems* and *setæ*.

2. S. *ténue*, Dicks. (*slender Splachnum*); leaves obovato-acuminate serrated, apophysis obconical narrower than the capsule, columella exserted. *Dicks. Cr. Fasc.* 2. *t.* 4. *f.* 2. *Fl. Brit. p.* 1171. *E. Bot. t.* 1133. *Drum. Musc. Scot. v.* 2. *n.* 15. *Musc. Brit. ed.* 2. *p.* 37. *t.* 9.— *S. serratum, Hedw. Sp. Musc. t.* 8. *f.* 1—3.— *Grimmia splachnoides, Fl. Brit. p.* 1197. (not *E. Bot.*)

Scottish mountains, upon the ground and on turfy soil in very elevated situations. On Ben-Lawers, most abundant. *Fr.* Autumn.—The *S. longicollum* (*Dicks. Cr. Fasc.* 4. *t.* 10.) Mr. Browne observes is a native of the N. W. coast of America, and was by mistake introduced into that work.

3. S. *mnioídes*, Linn. fil. (*brown tapering Splachnum*); leaves ovato-lanceolate much acuminated concave entire, apophysis obovate nearly as narrow as the capsule. *Musc. Brit. ed.* 2. *p.* 38. *t.* 9.— *α. minus*; of a deeper colour and with shorter stems. *S. mnioides, Linn. fil. Meth. Musc. p.* 6. *Hedw. St. Cr. v.* 2. *t.* 11. *Fl. Brit. p.* 1169. *E. Bot. t.* 1539. *Drum. Musc. Scot. v.* 1. *n.* 14.— *S. urceolatum, Dicks. and E. Bot. t.* 2417. *and Fl. Brit. p.* 1170. (not Hedw.)— *S. urceolatum, β. Wahl. Lapp.*— *β. majus*; of a paler colour and with elongated stems. —*S. fastigiatum, Dicks.*— *Fl. Brit. p.* 1171. *E. Bot. t.* 786.— *S. Brewerianum, Hedw. St. Cr. v.* 2. *t.* 38.— *Dill. Musc. t.* 44. *v.* 5.

Upon the ground in mountains. *Fr.* Summer.—The *S. urceolatum* is principally distinguished from this, by its obtuse and piliferous *leaves*.

4. S. *angustátum*, Linn. fil. (*narrow-leaved Splachnum*); leaves ovato-lanceolate much acuminated serrated, apophysis obovate somewhat narrower than the capsule, fruit-stalks shorter than the leaves. *Linn. fil. Meth. Musc. p.* 33. *Hedw. St. Cr. v.* 2. *t.* 22. *Fl. Brit. p.* 1169. *E. Bot. t.* 1132. *Musc. Brit. ed.* 2. *p.* 39. *t.* 9.

On cow-dung and half-decayed animal substances, rare. Most frequent, perhaps, among the great range of the Cairngorum and Braemar mountains, where it also grows on the turfy soil. *Fr.* Autumn.—This has a very peculiar habit, from the great length of the *leaves* and the shortness of the *seta*, which give it somewhat of a *Phascum*-like appearance.

5. S. *ampulláceum*, Linn. (*flagon-fruited Splachnum*); leaves ovato-lanceolate acuminate serrated, apophysis inversely flagon-shaped twice as wide as the capsule. *Linn. Sp. Pl. p.* 1572. *Hedw. St. Cr. v.* 2. *t.* 14. *Turn. Musc. Hib. p.* 16. *Fl. Brit.*

p. 1175. *E. Bot. t.* 144. *Hobs. Br. Mosses, v.* 1. *n.* 11. *Musc. Brit. ed.* 2. *p.* 39. *t.* 9.—*S. Turnerianum, Dicks. E. Bot. t.* 1116.

Bogs, upon the ground and on the dung of animals, frequent in the south, where it is almost the only species : rare in the north, especially in Scotland. Pentland hills, *Mr. Maughan.* Isle of Arran, *Dr. Bainbridge.* Near Ayr, *Mr. James Wilson.* Hill near Helensburgh, *Mr. Hopkirk* and *Joseph Dalton Hooker.* Forest of Glenmore, *Arnott* and *Hook.;* but always in small quantity. *Fr.* Summer.—Fine specimens of this plant, with the perfectly flagon-shaped *capsules* and long, graceful, delicately-coloured *setæ*, are equalled by few mosses in beauty, and surpassed perhaps by none, save the infinitely rarer *Splachna, rubrum* and *luteum*, of the North of Europe and America.

** *Leaves obtuse, or rarely acute.*

6. S. *vasculósum*, Hedw. (*large-fruited Splachnum*) ; leaves rhombeo-rotundate, the nerve disappearing below the point, apophysis globose much wider than the capsule.—α. leaves obtuse. *S. vasculosum, Hedw. St. Cr. v.* 2. *p.* 15. *Grev. Fl. Cr. Scot. t.* 179. *Musc. Brit. ed.* 2. *p.* 40. *Suppl. t.* 1.—β. leaves acute. *S. vasculosum*, var. *acutifolium, Grev. Fl. Cr. Scot. t.* 311. —*S. rugosum, Fl. Brit. p.* 1173? *E. Bot. t.* 2094.

Scottish mountains, at the sources of springs, principally among the Breadalbane mountains, bearing fruit on Ben More in the greatest profusion. Clova, *Mr. Drummond.* Catlaw near Kinnordy, *Arnott* and *Hook. Fr.* Summer.—The *leaves* are almost equal in size to those of *Bryum punctatum*, of a pale green colour ; and the *apophyses* are the largest of any British *Splachnum*, glossy, dark brown.

7. S. *Frælichiánum*, Hedw. (*Frælichian Splachnum*); leaves elliptical very obtuse, their nerve disappearing below the summit, apophysis obovate much narrower than the capsule, teeth of the peristome 16 geminate erect when dry. *Hedw. St. Cr. v.* 3. *t.* 40. *Hobs. Brit. Mosses, v.* 2. *n.* 12. (exotic specimens). *Musc. Brit. ed.* 2. *p.* 41. *t.* 9.—*S. reticulatum, Fl. Brit. p.* 1177. *E. Bot. t.* 2507.—*Dissodon Frælichianum, Grev. et Arn. Tent. Meth. Musc.* 3. *p.* 122.—*Bryum reticulatum, Dicks.*

On Ben High, Aberdeenshire, *Mr. Dickson. Fr.* Summer.—In habit and in the remarkably obtuse *leaves* more allied to *Splachnum scabrisetum* (*Hook. Musc. Ex. t.* 32.), *Systylium splachnoides*, Hornsch., and *Weissia splachnoides*, Schwaegr., than to the other species of the present Genus. Messrs. Greville and Arnott, observing that the *teeth* of the *peristome* in this groupe were erect (not reflexed) when dry, united them into one Genus, *Dissodon.* But these do not all agree in other respects in the configuration of the peristome. In *S. Frælichianum*, although the teeth do not become reflexed, yet they are 16 and geminate, or 8 double teeth split through the middle, each single tooth too is destitute of a central line. *Systylium*, Dr. Hornschuch still considers *sui generis. Weissia splachnoides* Mr. Brown had previously called *Cyrtodon*, but rather as a subgenus, than a genus in itself : yet this, as most different in the nature of its peristome, I incline to retain ; though at the same time I must acknowledge that it would be more accordant to nature, and simpler in practice, to rank them all under *Splachnum.*

11. Cýrtodon. *Br.* Cyrtodon.

Seta terminal. *Peristome* single, of 16 equidistant, entire *teeth*, marked with a central line, incurved when dry. *Capsule* with an evident *apophysis*. *Calyptra* mitriform, at length subdimidiate, glabrous, without furrows. (*Hook. in Fl. Lond. N. S. cum Ic.*, and *Grev. Scot. Cr. Fl. t.* 145., under the genus *Weissia*).—Named from κυρτος, *convex*, and οδων, a *tooth*; in allusion to the incurved peristome.

1. C. *splachnoides*, Br. (*splachnoid Cyrtodon*). *Br. in Parry's 1st Voy. App. p. ccxcix.*—*Dissodon splachnoides, Grev. et Arn. in Tent. Meth. Musc.* 3. *p.* 121. *t.* 13. *n.* 39—44.—*Eremodon splachnoides, Brid. Bryol. Univ. v.* 1. *p.* 234.—*Weissia splachnoides, Schwaegr. Suppl. v.* 1. *p.* 63. *t.* 17. *Drum. Musc. Scot. v.* 2. *n.* 33. *Musc. Brit. ed.* 2. *p.* 76. *t.* 14.—*Grimmia splachnoides, Fl. Brit. p.* 1197. *E. Bot. t.* 2164?—*Splachnum lingulatum, Dicks. Cr. Fasc.* 4. *t.* 10. *f.* 6. *Fl. Brit. p.* 1177. *E. Bot. t.* 2095.

Turf bogs, on the more elevated of the Scottish mountains. *Fr.* Aug.—Densely tufted; whole plant of a dark lurid colour. *Stems* elongated. *Leaves* lingulate, rounded at their summits, the *nerve* disappearing below the top. *Seta* elongated. *Capsule* obovate; *apophysis* obconical. *Peristome* of 16 subulate, incurved, equidistant *teeth*, of a full yellow colour, marked with a line down the middle, never splitting. *Lid* convex, acuminulate, when separated from the mouth of the capsule still frequently adhering to the top of the *columella*, which, as in all the splachnoid family, is very evident and exserted when the capsule becomes old and dry.

12. Conóstomum. *Linn.* Conostomum.

Seta terminal. *Peristome* single, of 16 equidistant *teeth*, all united at their summits. *Calyptra* dimidiate. (*Musc. Brit. t.* 1.)—Name κονος, a *cone*, and στομα, the *mouth*; from the teeth meeting at the point so as to form a cone.

1. C. *boreále*, Sw. (*northern Conostomum*); stems elongated, leaves lanceolate acuminate carinate slightly toothed. *Sw. in Schrad. Bot. v.* 1. *p.* 24. *t.* 5. *Drum. Musc. Scot. v.* 1. *n.* 71. *Musc. Brit. ed.* 2. *p.* 42. *t.* 10.—*Grimmia conostoma, Fl. Brit. p.* 1196. *E. Bot. t.* 1135.—*Bryum tetragonum, Dicks. Cr. Fasc.* 2. *t.* 4. *f.* 9.

Summits of the Scottish mountains, not unfrequent. *Fr.* Aug.—A rigid plant, compactly tufted, with much of the glaucous hue and general appearance of *Bartramia fontana*.

13. Encalypta. *Hedw.* Extinguisher-Moss.

Seta terminal. *Peristome* single, of 16 *teeth*. *Calyptra* campanulate, smooth, entirely enclosing the mature *capsule*. (*Musc. Brit. t.* 2.)—Name, εγκαλυπτος, *covered by a veil*; in allusion to the large calyptra which covers the capsule.

1. E. *streptocárpa*, Hedw. (*spiral-fruited Extinguisher-Moss*); stems elongated, leaves elliptico-lanceolate somewhat obtuse their nerve not produced beyond the summit, capsule cylindrical spirally striated, calyptra toothed at the base. *Hedw. Sp. Musc. t.* 6. *Turn. Musc. Hib. p.* 18. *Fl. Brit. p.* 1182. *E. Bot. t.* 2163. *Hobs. Br. Mosses, v.* 2. *n.* 20. *Musc. Brit. ed.* 2. *p.* 62. *t.* 13.—*Bryum ciliare, Dicks.*—*Dill. Musc. t.* 43. *f.* 71.

Stony mountainous countries: upon mortared walls. In fruit upon the walls of a bridge (since pulled down) in the grounds of the Duke of Athol, at Dunkeld: near Lough Bray, Ireland, *Mr. J. T. Mackay:* and in Derbyshire, *J. E. Bowman, Esq. Fr.* July.—The largest of the genus; hence it may be distinguished, no less than by its rigid *foliage*, spirally twisted *capsule*, and, above all, by its deep red very long compact capillary *teeth*. The *lid* too is spirally striated, in which particular, as well as in the leaves, this moss has an affinity with *Tortula subulata*.

2. E. *vulgáris*, Hedw. (*common Extinguisher-Moss*); stems short, leaves oblongo-elliptical obtuse their nerve produced a little beyond the summit, capsule cylindrical smooth, calyptra entire at the base. *Hedw. Sp. Musc. t.* 60. *Turn. Musc. Hib. p.* 17. *Fl. Brit. p.* 1180. *Drum. Musc. Brit. v.* 1. *t.* 22. *Musc. Brit. ed.* 2. *p.* 63. *t.* 13.—*Leersia vulgaris, Hedw. St. Cr. v.* 1. *p.* 28.—*Bryum extinctorium, Linn.*—*E. Bot. t.* 558. *Dill. Musc. t.* 45. *f.* 8.

On banks, walls, and rocks, principally such as are calcareous: not common in Scotland. *Fr.* March.—*Teeth* short and lanceolate, exceedingly fugacious; sometimes absent, according to Mr. Wilson, a minute toothed border only appearing. That gentleman also finds a variety with leaves having a blunt and rounded extremity, and an abbreviated nerve.

3. E. *ciliáta*, Hedw. (*fringed Extinguisher-Moss*); stems more or less elongated, leaves oblongo-acuminate their nerve produced considerably beyond the point, capsule cylindrical smooth, calyptra with a distinct fringe at the base. *Musc. Brit. ed.* 2. *p.* 63. *t.* 13.—*α. concolor;* leaves apiculate their points of the same colour. *E. ciliata, Hedw. Sp. Musc. t.* 61. *Turn. Musc. Hib. p.* 18. *Fl. Brit. p.* 1181. *E. Bot. t.* 1418. *Drum. Musc. Scot. v.* 1. *n.* 23.—*Leersia ciliata, Hedw. St. Cr. v.* 1. *t.* 19.—*Bryum extinctorium, β. Linn. Sp. Pl. p.* 1581. *Dill. Musc. t.* 45. *f.* 9.—*β. pilifera;* leaves much acuminated their points diaphanous (teeth of the veil deciduous). *E. alpina, E. Bot. t.* 1419.—*E. affinis, Hedw. fil. in Web. et Mohr, Beitr. t.* 4. *Schwaegr. Suppl. v.* 1. *p.* 58. *t.* 16.—*E. pilifera, Funck, Deutschl. Moose, t.* 8. *n.* 2.

Not uncommon, both *α.* and *β.*, on moist rocks in mountainous districts. *Fr.* Summer.—The fringe of the *calyptra*, in this species, is of as thick a texture as the calyptra itself, and apparently set on to it with a margin, thus not seeming to be a continuation of it.

4. E. *rhaptocárpa*, Schwaegr. (*striated-fruited Extinguisher-Moss*); stems more or less elongated, leaves oblong apiculate

the points of the same colour, capsule cylindrical sulcated, calyptra ciliated at the margin, cilia deciduous. *Schwaegr. Suppl. v.* 1. *p.* 56. *t.* 16. *Grev. Scot. Cr. Fl. t.* 163. *Musc. Brit. ed.* 2. *p.* 64. *Suppl. t.* 2.—*E. ciliata, γ. rhaptocarpa, Musc. Brit. ed.* 1. *p.* 36.

Alpine mountains. Ben Bulben, Ireland, *J. T. Mackay, Esq.* Scotland, especially in the Breadalbane mountains. *Fr.* Summer.—Here the *capsule* is sulcated, and besides, the *teeth*, or cilia of the calyptra, seem to be the torn or lacerated margin of the calyptra itself, more thin and membranous than the rest, and hence more easily broken off; so that the fringe often appears wanting, and is generally so figured.

14. Weíssia. *Hedw.* Weissia.

Seta terminal. *Peristome* single, of 16, nearly erect, entire, equidistant *teeth*. *Apophysis* none. *Calyptra* dimidiate. (*Musc. Brit. t.* 2.)—Named in compliment to *Frederic William Weis*, author of a *Cryptogamic Flora of Göttingen*.—From this genus, as it stood in the *Musc. Brit.*, I have removed *W. splachnoides*, to *Cyrtodon;* and *W. Templetoni*, to *Entosthodon*.

* *Capsule drooping, gibbous.*

1. W. *núda*, Hook. and Taylor, (*naked Weissia*); stems scarcely any, leaves ovato-lanceolate nerveless, capsule ovate cernuous gibbous on one side. *Musc. Brit. ed.* 1. *p.* 43. *ed.* 2. *p.* 77. *t.* 14. *Hobs. Brit. Mosses, v.* 1. *n.* 28.—*Conscinodon nudus, Brid.*—*Grimmia nuda, Fl. Brit. p.* 1197. *E. Bot.* 1421. *Turn. Musc. Hib. p.* 25.—*Bryum nudum, Dicks. Cr. Fasc.* 4. *t.* 10. *f.* 15.

On clayey soil in the north of England and Scotland, but rare. *Fr.* March.—This is a plant of a peculiar habit, of a reddish colour, and minute size. The annulus is large at the mouth of the capsule; the teeth are broad at the base, and there cleft in the centre half-way up. *Mr. Caley* discovered it near Manchester, and *Mr. Don* by the side of the Tay, near Perth.

2. W. *nigríta*, Hedw. (*black-fruited Weissia*); stems elongated, leaves lanceolate acuminated nerved, capsule obovate arcuato-cernuous gibbous furrowed, lid hemisphærical obtusely pointed. *Hedw. St. Cr. v.* 3. *t.* 39. *Drum. Musc. Scot. v.* 1. *n.* 27. *Musc. Brit. ed.* 1. *p.* 78. *t.* 14.—*Grimmia nigrita, Fl. Brit. p.* 1195. *E. Bot. t.* 1825.—*Bryum nigritum, Dicks.*—*Catoscopium, Brid.*

Moist banks in mountainous districts. Plentiful on Ben-y-gloe, near Blair in Athol. *Fr.* Aug.—This plant has a capsule still more drooping than the preceding. In all the following species, the capsules are nearly erect.

** *Capsule erect, or cernuous from the curvature of the seta, equal. Leaves ovate or lanceolate (nerved).*

3. W. *elongáta*, Hoppe and Hornsch. (*elongated Weissia*); stems elongated densely tufted, leaves closely imbricated lanceolato-

ovate obtuse reticulated entire, nerve strong reaching nearly to the point, seta flexuose arched, capsule ovali-pyriform, lid conical. — *Hoppe et Hornsch. Mss.* — *Hook. Musc. Exot. t.* 101. — *Oreas elongata, Brid. Bryol. Univ. v.* 1. *p.* 382. — "*Weissia compacta, Hornsch. et Hopp. Pl. Alp. Exsicc. Dec. ii.*" — *W. Mielichoferiana, Funck, Crypt. Fasc. xxiv. n.* 490. *Hornsch. et Hopp. Bot. Zeit. v.* 2. *p.* 86. — *W. Mielichoferi β. Schwaegr. Suppl. ii. p.* 47. *t. cxiv. Funck, Deutschl. Moos. p.* 13. *t.* 9.

Rocks above Loch Callater, Aberdeenshire, *Dr. Greville. Fr.* —— Some tufts of this remarkable plant have been found in the station just mentioned: but destitute of fructification. In general appearance this moss resembles *Bryum julaceum;* even the fruit, which I possess from the Tyrol, is very unlike that of any other *Weissia.* The capsule is more or less cernuous; but this is not owing to a curvature in the base of the fruit, but in the upper part of the seta.

4. W. *Starkeána,* Hedw. (*Starkean Weissia*); stems very short, leaves ovate with an excurrent nerve, capsule ovate erect, lid conical, teeth of the peristome subulate acute (mostly red). *Hedw. St. Cr. v.* 3. *t.* 23. *Musc. Brit. ed.* 2. *p.* 79. *t.* 14. — *Grimmia Starkeana, Fl. Brit. p.* 1186. *E. Bot. t.* 1400. — *Bryum minutum, Dicks.*

Banks and fields in the middle and south of Britain. *Fr.* Feb. — Teeth of the peristome connected by a common base. *Wilson.*

5. W. *affínis,* Hook. and Taylor, (*blunt-toothed Weissia*); stems very short, leaves ovate with an excurrent nerve, capsule ovate erect, lid conical, teeth of the peristome short broad obtuse whitish. *Musc. Brit. ed.* 1. *p.* 44. *ed.* 2. *p.* 79. *t.* 14.

Fields and on gravelly banks. *Fr.* Jan. — The difference in the peristome of this plant from the last is most striking, and resembles that of *W. trichodes* in its more perfect state: yet in other respects it is hardly to be distinguished from *W. Starkeana.*

6. W. *lanceoláta,* Hook. and Taylor (*lance-leaved Weissia*); stems somewhat elongated, leaves ovate with an excurrent nerve almost piliferous, capsule ovate, lid obliquely rostrate. *Musc. Brit. ed.* 1. *p.* 45. *ed.* 2. *p.* 80. *t.* 14. — *Leersia lanceolata, Hedw. St. Cr. v.* 2. *t.* 23. — *Grimmia lanceolata, Fl. Brit. p.* 1186. *E. Bot. t.* 1408. — *Encalypta lanceolata, Turn. Musc. Hib. p.* 19. — *Bryum lanceolatum, Dicks.*

Moist banks. *Fr.* March. — Allied to the two preceding, but having a rostrate lid; and to *Gymnostomum truncatulum,* especially the larger varieties of it; but the leaves are more erect, more closely imbricated, and the apiculus is longer. Teeth of the peristome oblique, as in *W. verticillata,* separate to the base, sometimes split, as in *Didymodon.* (*Wilson.*)

7. W. *latifólia,* Schwaegr. (*broad-leaved Weissia*); stems unbranched very short, leaves broadly obovate with a small acumen concave imbricated shining, the nerve reaching nearly to the point, capsule oblong cylindrical erect, lid rostrate. *Schwaegr. Suppl. v.* 1. *p.* 64. *t.* 18. *Grev. Scot. Cr. Fl. t.* 149. *Musc. Brit. ed.* 2. *p.* 80. *Suppl. t.* 3.

Mountains of Clova, Scotland, in the crevices of rocks, growing with *Didymodon glaucescens*, and *Oxytropis campestris; Mr. T. Drummond. Fr.* August.—The leaves of this rare moss are very broad and glossy, and so closely imbricated as to form a sort of bulb at the base of the seta.

*** *Capsule erect, equal. Leaves linear or subulate (nerved).*

8. W. *striáta*, Hook. and Taylor, (*striated Weissia*); leaves linear denticulate crisped when dry, capsule ovato-turbinate sulcate erect, lid obliquely subulate. *Musc. Brit. ed.* 2. *p.* 81. *t.* 15.—*α. minor;* leaves linear subulate subserrulate. *W. striata, Musc. Brit. ed.* 2. *p.* 81. *t.* 15. *Drum. Musc. Scot. v.* 1. *n.* 29.—*Grimmia striata, Schrad. Diar. Bot. v.* 2. *p.* 57. *Fl. Brit. p.* 1185.—*W. fugax, Hedw. Sp. Musc. t.* 13.—*W. Schisti, Schwaegr. Suppl. p.* 72. *t.* 80. (not *E. Bot.*)—*Grimmia Schisti, Fl. Brit. p.* 1185.—*β. major;* leaves broadly linear denticulate. *W. denticulata, Schwaegr. Suppl. v.* 1. *p.* 75. *t.* 19.

Moist banks and crevices of rocks in alpine countries. *Fr.* June.

9. W. *trichódes*, Hook. and Taylor, (*bristle-leaved Weissia*); stems scarcely any, leaves subulato-setaceous entire, capsule ovate striated, lid rostrate. *Musc. Brit. ed.* 1. *p.* 45. *ed.* 2. *p.* 82. *t.* 15. *Hobs. Br. Mosses, v.* 1. *n.* 32.—*Gymnostomum trichodes, Mohr, Cr. Germ.*—*Moug. et Nestler, n.* 711.—*Anictangium trichodes, Schwaegr. Suppl. v.* 1. *p.* 33. *t.* 12.

On granite rocks, moistened by the spray of a rivulet, near Dublin. Sandstone rocks near Henfield, Sussex, *Mr. Borrer*. Greenfield, near Manchester, *Mr. Hobson*. Welsh mountains, rare, *Mr. W. Wilson*. Ben Buy, Argyleshire, and on Ben Nevis, *Rev. Colin Smith*. *Fr.* Feb.—There is a stout *annulus* present in this moss, within which and in an early stage there exists a membranous horizontal ring, which eventually splits into 16 short, and very obtuse teeth, becoming erect and afterwards reflexed over the mouth of the capsule. In habit, this minute plant is allied to *W. pusilla* and *Gymnostomum tenue*.

10. W. *cirráta*, Hedw. (*curl-leaved Weissia*); leaves broadly subulate crisped when dry, their margins recurved, capsule ovate, lid rostrate. *Hedw. Sp. Musc. t.* 12. *f.* 7. *Hobs. Br. Mosses, v.* 1. *n.* 31. *Musc. Brit. ed.* 2. *p.* 82. *t.* 15.—*Grimmia cirrata, Fl. Brit. p.* 1189. *E. Bot. t.* 235.—*Grimmia Dicksoni, Fl. Brit. p.* 1189. *E. Bot. t.* 1420.—*Mnium cirratum, Linn.*—*Dill. Musc. t.* 48. *f.* 42.

On trees, thatched roofs, posts and rails; chiefly, if not entirely, in the middle and south of Britain, often covering old paling, and especially the horizontal pieces, on the upper side, with small crowded cushion-like tufts. *Fr.* Spring.—Nearly allied to *W. crispula*, but distinguishable by its shorter, wider, carinate leaves, with recurved margins.

11. W. *tenuiróstris*, Hook. and Taylor, (*slender-beaked Weissia*); stems loosely tufted elongated, leaves linear-acuminate grooved flexuose waved and plane at the margin, nerve opaque, capsule subobliquely cylindrical, lid rostrate erect as long as the capsule. *Musc. Brit. ed.* 2. *p.* 83. *Suppl. t.* 3. (*not good*).

Moist rocks; in fructification at Campsie, near Glasgow. About Powerscourt Waterfall, near Dublin, common, but barren. *Fr.* (fully ripe) April.—The *stems* are elongated, flaccid, loosely tufted, branched, branches spreading. *Leaves* lax, spreading, one third of an inch long, linear-acuminate, grooved, flexuose, entire, waved at the margins, which are not at all recurved; their substance is rather thick, yet tender, composed of such minute cellules as to have no appearance of being reticulated, the nerve strong and reaching to the point. *Fruit* rare. *Seta* scarcely an inch long, pale reddish yellow, sometimes two from the same perichætium. *Capsule* cylindrical or oblongo-cylindrical, each with its side slightly unequal. *Lid* subulate, straight, two-thirds of the length of the capsule, reddish-yellow; *calyptra* dimidiate. *Peristome* of 16 equidistant, linear-subulate, somewhat torulose, red *teeth*, erect when dry, when moist forming a cone or arch over the mouth of the capsule.—The general habit of this plant is quite peculiar among the *Weissiæ*, having loosely entangled, spreading stems and remarkably flaccid patent leaves, in these last particulars resembling *Trichostomum Barbula, Schwaegr.;* and still more *Tortula tortuosa.* The peristome, however, is that of a *Weissia.* In some respects it approaches in the general form of the leaves and of the capsule, *W. curvirostra;* but that is abundantly distinguished by its erect, bright red, wiry stems, its leaves much shorter and smaller, less waved, so distinctly recurved at the edges as to be margined: and above all by its lid, whose beak is far shorter, more obtuse and oblique in its direction. In April, 1831, Dr. Greville and myself gathered numerous specimens in the Campsie station, but the fruit was rare.

12. W. *curviróstra*, Hook. and Taylor, (*curve-beaked Weissia*); stems elongated wiry (usually red), leaves patent linear-subulate margined with the revolute edge, nerve strong, capsule ovato-cylindrical, lid shortly rostrate oblique, teeth of the peristome subulate erect. *Musc. Brit. ed.* 1. *p.* 46. *ed.* 2. *p.* 84. *t.* 14. *Drum. Musc. Scot. v.* 2. *n.* 34.—*W. recurvirostra, Hedw. St. Cr. v.* 1. *t.* 7.—*Grimmia recurvirostra, Fl. Brit. p.* 1190. *E. Bot. t.* 1438.—*Bryum curvirostrum, Dicks.—Dill. Musc. t.* 48. *f.* 45.

On sandy or gravelly moist banks. *Fr.* Sept.—Habit of a *Tortula.* The nerve is dark and strong, rendering the leaves peculiarly rigid.

13. W. *críspula*, Hedw. (*curled Weissia*); stems elongated branched, leaves from a broad base lanceolato-subulate crisped when dry, their margins incurved, capsule ovato-elliptical, lid rostrate. *Hedw. Sp. Musc. t.* 12. *f.* 1—6. *Drum. Musc. Scot. v.* 1. *n.* 28. *Musc. Brit. ed.* 2. *p.* 84. *t.* 15.—*Grimmia crispula, Turn. Musc. Hib. p.* 28. *Fl. Brit. p.* 1192. *E. Bot. t.* 2203.

On rocks, especially in mountainous districts, abundant. *Fr.* May.—Around the setæ the leaves form a sort of perichætium.

14. W. *controvérsa*, Hedw. (*green-cushioned Weissia*); stems short nearly simple, leaves linear-subulate crisped when dry, the margins involute, capsule ovato-elliptical, lid rostrate. *Hedw. St. Cr. v.* 3. *t.* 5. *Drum. Musc. Scot. v.* 2. *n.* 35. *Musc. Brit. ed.* 2. *p.* 85. *t.* 15.—*W. microdus, Schwaegr. Suppl. v.* 1. *p.* 77. —*Grimmia controversa, Fl. Brit. p.* 1177. *E. Bot. t.* 1367.

Turn. Musc. Hib. p. 27.—*Bryum viridulum, Huds.*—*Bryum virens, Dicks.*—*Dill. Musc. t.* 48. *f.* 43.

Banks, frequent. *Fr.* Spring.—See Mr. Wilson's remarks on the affinity of this plant with *Gymnostomum microstomum*, under that species.

15. W. *calcárea.* Hedw. (*Chalk Weissia*); stems scarcely any, leaves erect from a broad base linear obtuse thick with a very broad nerve, capsule turbinate, lid rostrate. *Hedw. Sp. Musc. t.* 11. *f.* 1—6. *Hobs. Br. Mosses, v.* 2. *n.* 30. *Musc. Brit. ed.* 2. *p.* 85. *t.* 15.—*Grimmia calcarea, Fl. Brit. p.* 1177. *Turn. Musc. Hib. p.* 25.—*Bryum calcareum, Dicks.*—*E. Bot. t.* 191.

On the perpendicular faces of chalk cliffs in the south of England, which are rendered almost black with it. *Fr.* May.—The short, upright, rigid leaves of this plant have a striking appearance, and resemble remarkably, in miniature, those of *Polytrichum aloides*, to which also their dense texture assimilates them, their upper half consisting almost entirely of the broad nerve, which below is much narrower, passing gradually on each side into the dilated base.

16. W. *recurváta*, Hook. and Taylor, (*recurved Weissia*); stems scarcely any, leaves erect subulate, capsule broadly ovate, seta curved, lid rostrate. *Musc. Brit. ed.* 1. *p.* 47. *ed.* 2. *p.* 85. *t.* 15. *Drum. Musc. Scot. v.* 2. *n.* 36.—*Grimmia recurvata, Hedw. St. Cr. v.* 1. *t.* 38. *Fl. Brit. p.* 1183. *E. Bot. t.* 1489. *Turn. Musc. Hib. p.* 24.—*Bryum curvatum, Dicks.*

Rocks in the north of England, Wales and Scotland. *Fr.* June.—The fruitstalk of this plant, always arched when growing, or if moistened after being gathered, sufficiently distinguishes it from the following species.

17. W. *pusílla*, Hedw. (*dwarf Weissia*); stems scarcely any, leaves subulate erect, capsule pyriform, seta always erect, lid rostrate. *Hedw. St. Cr. v.* 2. *t.* 29. *Musc. Brit. ed.* 2. *p.* 86. *t.* 15.—*Grimmia pusilla, Fl. Brit. p.* 1184. *E. Bot. t.* 2551.

On white limestone rocks, near Belfast, *Mr. Templeton* and *Mr. Drummond.* Youlgreave, Derbyshire, *J. E. Bowman, Esq.* Near Buxton, *Mr. W. Wilson. Fr.* May.

18. W. *verticilláta*, Schwaegr. (*whorled Weissia*); stems elongated branched, leaves nearly erect linear-subulate with a strong nerve dotted, capsule ovate, lid conico-acuminate. *Schwaegr. Suppl. v.* 1. *p.* 71. *t.* 20. *Musc. Brit. ed.* 2. *p.* 86. *t.* 15.—*Grimmia verticillata, Turn. Musc. Hib. p.* 31. *Fl. Brit. p.* 1191. *E. Bot. t.* 1258.—*Weissia capillacea, Schwaegr.*—*Bryum fasciculatum, Dicks.*—*Bryum verticillatum, Linn.*—*Dill. Musc. t.* 47. *f.* 35.

On rocks among trickling water, not general. *Fr.* Aug.—This pretty *Weissia*, of a delicately pale and bright green colour, has the lower part of its stems frequently covered with a white earthy incrustation, which is found on the plant, whatever be the nature of the rock whereon it grows, whether micaceous schist, as at the Dargle, Ireland, or sandstone, as in the south of Ireland, or on calcareous rocks as in Yorkshire, and

at Aberdour, and Glen Tilt, Scotland. The teeth of the peristome are slightly oblique at the first falling of the lid. (*Wils.*)

19. W. *acúta*, Hedw. (*sharp-pointed Weissia*); stems branched, leaves subulato-setaceous subsecund rigid canaliculate, capsule turbinate, lid rostrate. *Hedw. St. Cr. v.* 3. *t.* 35. *Drum. Musc. Scot. v.* 1. *n.* 30. *Musc. Brit. ed.* 2. *p.* 87. *t.* 14.—*Grimmia acuta, Turn. Musc. Hib. p.* 29. *Fl. Brit. p.* 1192. *E. Bot. t.* 1644.—*Weissia rupestris, Hedw. Sp. Musc. t.* 14.—*Bryum acutum, Dicks.*—*B. splachnoides, Dill. Musc. t.* 47. *f.* 34.

Moist alpine rocks, abundant. *Fr.* Summer.—The leaves are remarkably rigid, when dry, of a shining brownish-green. The capsule has a swelling at the base, somewhat resembling an apophysis. Small specimens of *Dicranum fulvellum* bear a slight resemblance to this moss, and in the first edition of *Musc. Brit.*, they were injudiciously confounded.

15. Grímmia. *Ehrh.* Grimmia.

Seta terminal. *Peristome* of 16 entire or perforated, rarely cleft, equidistant *teeth*. *Calyptra* mitriform. (*Musc. Brit. t.* 2.)—Named in honour of *Dr. F. C. Grimm*, author of some botanical writings.—This genus bears the same relation to *Weissia*, that *Trichostomum* does to *Didymodon*: its essential distinguishing character residing in the mitriform calyptra. This is accompanied by a peculiarity of aspect in the whole plant, which is of a singularly lurid blackish-green colour, the leaves often tipped with diaphanous points.

* *Fruit sessile or nearly so.*

1. G. *apocárpa*, Hedw. (*sessile Grimmia*); stems branched, leaves ovato-lanceolate recurvo-patent their margins reflexed, those of the perichætium having the nerve disappearing immediately below their summits, capsule ovate sessile, lid shortly rostrate *Musc. Brit. ed.* 2. *p.* 65. *t.* 13.—*a. nigro-viridis;* leaves broad blackish-green. *G. apocarpa, Hedw. St. Cr. v.* 1. *t.* 39. *Turn. Musc. Hib. p.* 20. *Fl. Brit. p.* 1200. *E. Bot. t.* 1134. *Drum. Musc. Scot. v.* 1. *p.* 26.—*G. alpicola, Swartz, Musc. Suec. t.* 1. *Hedw. Sp. Musc. t.* 15. *Fl. Brit. p.* 1199.—*G. rivularis, Brid. in Schrad. Journ. v.* 5. *t.* 3. *Turn. Musc. Hib. p.* 21. *t.* 2. *f.* 2. *Schwaegr. Suppl. v.* 1. *t.* 23. *Fl. Brit. p.* 1200.—*G. gracilis, Schwaegr. Suppl. v.* 1. *t.* 23.—*G. apocaula, Hoffm.*—*Dill. Musc. t.* 32.—*β. stricta;* stem elongated, leaves narrower reddish-brown.—*G. stricta, Turn. Musc. Hib. p.* 20. *t.* 2. *f.* 1.

a. On trees and moist places, as well as in alpine rivulets.—*β.* rocky places in elevated mountains. *Fr.* Spring.—A very abundant and highly variable plant. The leaves have sometimes diaphanous points, at other times they are destitute of them. The var. *stricta* is the most remarkable state, with slender elongated stems and of a reddish brown colour. The columella is slender upwards.

2. G. *marítima*, Turn. (*sea-side Grimmia*); stems short pulvinate, leaves lanceolate acuminate nearly erect crisped when

dry, their margins recurved, those of the perichætium with the nerve running beyond their summits, capsule ovate sessile, lid shortly rostrate. *Turn. Musc. Hib. p.* 23. *t.* 5. *f.* 2. *Fl. Brit. p.* 1195. *E. Bot. t.* 1645. *Drum. Musc. Scot. v.* 1. *p.* 25. *Schwaegr. Suppl. v.* 1. *p.* 95. *t.* 22. *Musc. Brit. ed.* 2. *p.* 66. *t.* 13.—*G. alpicola*, *δ. Wahl.*

On rocks by the sea-shore. *Fr.* March.—Wahlenberg is surely not correct in considering this as a *var.* of the preceding. It is very constant to its characters. In both the teeth of the peristome are often irregularly perforated. "*Columella* adherent to the lid and thickened upwards." *Wils.*

** *Seta exserted, curved or geniculated.*

3. G. *saxícola*, Schwaegr. (*sandstone Grimmia*); stems scarcely any, leaves linear-subulate crisped when dry, seta geniculated, capsule ovate, lid rostrate straight. *Schwaegr. Suppl. v.* 1. *p.* 82. *t.* 22. *Musc. Brit. ed.* 2. *p.* 67. *t.* 13. *Hook. in E. Bot. t.* 2627.—*Dicranum saxicola, Mohr.*—*Campylopus, Brid.*

On sandstone rocks, Blackdown, Sussex, rare; *Mr. Borrer.* On granite rocks in the Dublin mountains. *Fr.* May.—In size and general appearance, this can hardly, by the naked eye, be distinguished from *Weissia trichodes*, or from *W. recurvata.* The crisped *leaves*, with the different nature of the *peristome* and mitriform *calyptra*, multifid at the base, are, however, certain marks of distinction.

4. G. *pulvináta*, Sm. (*grey cushioned Grimmia*); stems short pulvinate, leaves narrow-elliptical their margins recurved, their points diaphanous piliform. seta curved, capsule ovate striated, lid conical acuminated. *E. Bot. t.* 1728. *Drum. Musc. Scot. v.* 2. *n.* 26.—*Dicranum pulvinatum, Swartz.*—*Turn. Musc. Hib. p.* 78. *Fl. Brit. p.* 1214. *Schwaegr. Suppl. v.* 1. *p.* 189.—*Fissidens pulvinatus, Hedw. Sp. Pl. t.* 40.—*Bryum pulvinatum, Linn.*—*Dill. Musc. t.* 50. *f.* 65.

On walls and rocks, frequent. *Fr.* Spring.—The *teeth* of the peristome are generally perforated or deeply cleft, rarely entire: but the plant ranks most unnaturally with *Fissidens* or *Dicranum*, where some authors have placed it.

5. G. *trichophýlla*, Grev. (*hair-pointed Grimmia*); stems elongated loosely tufted, leaves lax waved lanceolate gradually tapering into a diaphanous point their margins recurved, seta flexuose and curved, capsule elliptical-ovate sulcate, lid rostrate. *Grev. Fl. Scot. Cr. t.* 100. *Drum. Musc. Scot. v.* 2. *n.* 27. *Musc. Brit. ed.* 2. *p.* 68. *Suppl. t.* 2.—*Dicranum pulvinatum*, *β. Turn. Musc. Hib. p.* 78. *t.* 3. *f.* 1.?

Discovered by *Dr. Greville* on stone walls at the foot of Arthur's Seat, and since found in similar situations in many places, especially the Highlands of Scotland. Near Dublin, *Dr. Scott* and *Dr. Stokes.* N. Wales, *Wilson.* *Fr.* Apr.—With the teeth of a *Grimmia* (or only slightly perforated or split at the summit) this plant has the foliage and habit of *Trichostomum.*

6. G. *spirális,* Hook. and Taylor, (*spiral-leaved Grimmia*); stems elongated pulvinate, leaves lanceolate tapering into a diaphanous hair-like point erect when moist, spirally twisted when dry, seta curved, capsule ovate smooth. *Drum. Musc. Scot. v.* 2. *n.* 29. *Grev. Fl. Cr. Scot. t.* 203. *Musc. Brit. ed.* 2. *p.* 69. *Suppl. t.* 2.—*G. cernua, Bryol. Germ. v.* 2. *p.* 174. *t.* 24. *f.* 23.

Abundant on rocks, and especially dry and exposed ones, in the higher mountains, both of Scotland and Ireland. *Fr.* Sept.—We observe a dark central line in the teeth of this moss, and Dr. Greville finds some to be bifid or even trifid at the extremity.

7. G. *tórta,* Hornsch. and Nees, (*twisted-leaved Grimmia*); stems elongated exceedingly densely pulvinate of a very soft texture, leaves lanceolate acuminate the upper ones scarcely piliferous, all of them remarkably spirally twisted when dry. *Bryol. Germ. v.* 2. *p.* 179. *t.* 22. *f.* 24.—*G. torquata, Hook. in Drum. Musc. Scot. v.* 2. *n.* 28. *Grev. Scot. Fl. Cr. t.* 199. *Musc. Brit. ed.* 2. *p.* 70. *Suppl. t.* 2.

Dry rocks, at a considerable elevation on the Scottish, especially the Breadalbane, mountains, plentiful, but always barren.—When dry, the tufts form firm, rigid masses: when moist, the dichotomous stems are exceedingly soft and flaccid, so that they can scarcely be handled without falling down. They are of a rich deep brown colour, paler at the points. *G. spiralis* differs from this in its more rigid texture when moist, with longer diaphanous points to the leaves, which are torquate and of a blacker hue.

*** *Seta exserted, straight.*

8. G. *leucophæa,* Grev. (*hoary Grimmia*); stems rather short tufted, leaves elliptical very hoary with long piliferous points, seta a little longer than the leaves, capsule ovate, teeth of the peristome often bifid and perforated, lid rostrate short. *Grev. in Wern. Trans. v.* 4. *cum Ic. Hobs. Brit. Mosses, v.* 2. *n.* 24. *Drum. Musc. Scot. v.* 2. *n.* 30. *Musc. Brit. ed.* 2. *p.* 70. *Suppl. t.* 3.

On rocks of trap formation; King's Park, Edinburgh, *Robert Brown, Esq.* At Fairhead, Ireland, on basalt. Coast of Fife, *Mr. Arnott. Fr.* Apr.—Allied to *G. pulvinata,* but the seta is straight and the capsule smooth; thus it has the leaves of *G. pulvinata* and the fruit of *G. ovata.* This species seems hardly distinct from the South American *G. campestris* (*Hook. Musc. Ex. t.* 129.).

9. G. *ováta,* Web. et Mohr, (*ovate Grimmia*); stems more or less elongated, leaves lanceolato-subulate gradually produced into long diaphanous hair-like points their margins recurved, seta exserted, capsule ovate, teeth of the peristome often perforated and split, lid rostrate. *Web. et Mohr, It. Suec. t.* 2. *f.* 4. *Schwaegr. Suppl. v.* 1. *p.* 24. *Drum. Musc. Scot. v.* 1. *n.* 24. *Musc. Brit. ed.* 2. *p.* 71. *t.* 13.—*Dicranum ovatum, Hedw. St. Cr. v.* 3. *t.* 34.—*Dicranum ovale, Hedw. Sp. Musc. p.* 140.

Fl. Brit. p. 1214. *E. Bot. t.* 2165. *Turn. Musc. Hib. p.* 77.— *Bryum ovale, Dicks. Cr. Fasc.* 4. *p.* 14.

Rocks, principally in alpine situations. *Fr.* June.

10. G. *Doniána*, Sm. (*Donian Grimmia*); stems short, leaves lanceolato-subulate produced into long diaphanous hair-like points their margins incurved, capsule ovate, teeth of the peristome quite entire, lid shortly rostrate. *Fl. Brit. p.* 1198. *E. Bot. t.* 1259. *Hobs. Br. Mosses, v.* 1. *n.* 27. *Musc. Brit. ed.* 2. *p.* 72. *t.* 13.— *G. sudetica? Schwaegr. Suppl. v.* 1. *t.* 24.

Alpine rocks. *Fr.* April. (*Wils.*) Aug.— Always much smaller than *G. ovata*, with the teeth of the peristome quite entire; nor have I ever seen any intermediate states.

11. G. *atráta*, Mielich. (*black tufted Grimmia*); stems elongated very compact, leaves dense erecto-patent linear-lanceolate rigid obtuse slightly keeled destitute of hair-like points, capsule cylindrical, lid conical with a short somewhat oblique thick beak, teeth narrow-lanceolate (yellow) marked with a line or occasionally split.—*Mielichoffer in Hoppe and Hornsch. Pl. Select.*—*Hornsch. in Bot. Zeit.* 1819. *p.* 85. *Schwaegr. Suppl. v.* 2. *P.* 2. *t.* 116. *Hook. Musc. Exot. v.* 2. *t.* 100; (small specimens, but otherwise very characteristic). *Bryol. Germ. v.* 2. *p.* 164. *t.* 23. *f.* 19. (capsules too short). *Schwaegr. Suppl. II. P.* 2. *p.* 59. *t.* 116. (good).

Rocks above Glen Callater, *Dr. Greville*, 1830. *Fr.* (scarcely mature) Aug.— Hitherto I believe this very distinct *Grimmia* had only been found on the Alps of Saltzburg: The *stems* and thickened *branches* are very densely tufted. The *leaves* are almost black, except the uppermost, which incline to green. The *seta* is rather thick, yellowish, orange-coloured at the base. *Capsule* truly, but broadly cylindrical. *Lid* with a short slightly inclined *beak*. *Peristome* pale yellow.

12. G. *unicolor*, Hook. (*dingy Grimmia*); stems elongated slender rather loosely tufted, leaves lax erect from a broad base linear-lanceolate rigid obtuse keeled upwards destitute of hair-like points, capsule elliptical, lid with a subulate inclined beak, teeth narrow-lanceolate (red) entire. *Hook. in Drum. Musc. Scot. v.* 2. *p.* 32. *Grev. Scot. Cr. Fl. t.* 123. *Musc. Brit. ed.* 2. *p.* 72. *Suppl. t.* 3.— *G. atrata, Hook. in Drum. Musc. Americ. n.* 57. (not *Mielich.*)

Abundant on the steep, almost perpendicular, face of an exposed rock above Bachnagairn, a hunting Lodge belonging to the Hon. D. Ogilvie, at the head of Clova, Angus-shire, *Mr. T. Drummond. Fr.* Aug.— Allied to the last, but truly distinct, although I had myself confounded the American specimens from Lake Superior, with the *G. atrata*. The whole plant is of a browner hue and more opaque, the *stems* are quite slender, the *leaves* erect, broader at the base, narrower and more keeled upwards. *Capsule* broader and shorter. *Lid* with a very slender, inclined *beak*, often half as long as the capsule. *Teeth* deep red, not marked with a line, nor cleft. From the stems, filiform barren *branches* frequently arise, clothed with minute imbricated ovate *leaves*. *Calyptra* mitriform, sometimes eventually dimidiate, as in some *Trichostoma*.

From this, *Trichostomum ellipticum* may be known by its more crowded spreading acuminated leaves, the glossy rigid more oval *capsule*, and its much longer and perfectly straight beak to the *lid*, and deeply divided teeth of the *peristome*.

16. Didýmodon. *Hedw.* Didymodon.

Seta terminal. *Peristome* single, of 16 or 32 *teeth* approaching in pairs or united at the base. *Calyptra* dimidiate. (*Musc. Brit. t.* 2.)—Named from διδυμος, *twin*, and οδων, *a tooth*; from the approximation of the teeth in pairs.

1. D. *purpúreus*, Hook. and Taylor, (*purple Didymodon*); stems scarcely branched, leaves lanceolate acuminate carinated their margins recurved entire, capsule ovato-cylindraceous oblique substrumose furrowed when dry, lid conical. *Musc. Brit. ed.* 1. *p.* 65. *ed.* 2. *p.* 113. *t.* 20. *Drum. Musc. Scot. v.* 2. *n.* 49. —*Dicranum purpureum*, *Hedw. Sp. Musc. t.* 36. *Turn. Musc. Hib. p.* 72. *Fl. Brit. p.* 1217. *E. Bot. t.* 2262.—*D. purpurascens*, *D. Celsii*, and *D. intermedium*, *Hedw.*—*D. strictum*, *Sm.*—*D. papillosum*, *Brid.*—*Trichostomum papillosum*, *Sm.*—*Bryum Celsii* and *Mnium purpureum*, *Linn.*, and *Bryum papillosum*, *strictum*, *tenue* and *bipartitum* of *Dicks.* may confidently be referred here.

On the ground and on moist banks, most abundant. *Fr.* Spring.—Variable as this plant assuredly is in its stems and foliage, it is very constant in the form of the fruit, by which it may always be known. The peristome is that of a *Didymodon*, but the pairs of teeth are connected by transverse bars.

2. D. *inclinátus*, Sw. (*inclined-fruited Didymodon*); stems somewhat elongated, leaves bifarious from a sheathing base subulate, capsule ovate inclined smooth, lid conical. *Swartz, Musc. Suec. p.* 28. *Drum. Musc. Scot. v.* 1. *n.* 53.—*Cynontodium inclinatum*, *Hedw. Sp. Musc. p.* 58.—*Grimmia inclinata*, *Fl. Brit. p.* 1196. *E. Bot. t.* 1824.—*Swartzia inclinata*, *Hedw. St. Cr. v.* 2. *t.* 27.—*Bryum inclinatum*, *Dicks.*

Usually on mountain rocks; but rare. On the sands of Barrie, near Dundee, growing with *Weissia nigrita*, *Mr. Don. Fr.* Aug.—The *teeth* are so broad in this species that were it not for their approximation in pairs, we should certainly rank it with the *Weissiæ*.

3. D. *nervósus*, Hook. and Taylor, (*thick-nerved Didymodon*); leaves obovate shortly apiculate their nerve incrassated above, capsule ovate erect, lid shortly rostrate. *Musc. Brit. ed.* 1. *p.* 66. *ed.* 2. *p.* 115. *t.* 20.—*Grimmia atro-virens*, *E. Bot. t.* 2015.

On dry banks, especially in maritime situations in the south of England, Wales, and Ireland. *Fr.* Spring.—This species has wider *leaves* than its congeners, and a *nerve* remarkably thickened upwards. The 32 teeth approach in pairs, and are, as in *D. purpureus*, connected by transverse bars.

4. D. *flexifólius*, Hook. and Taylor, (*wavy-leaved Didymodon*); stems more or less elongated, leaves erecto-patent oblongo-ovate

flexuose strongly serrated at the point the margin recurved below, capsule erect cylindrical, lid rostrate. *Musc. Brit. ed.* 1. *p.* 66. *ed.* 2. *p.* 115. *t.* 20. *Drum. Musc. Scot. v.* 2. *n.* 46. — *Trichostomum flexifolium, Fl. Brit. p.* 1246. *E. Bot. t.* 2490. — *Bryum flexifolium, Dicks. Cr. Fasc.* 3. *t.* 7.

On sterile banks, moors, thatched roofs, and where heath has been burned; not unfrequent. *Fr.* Spring. — A very distinct and well-marked British moss, always of a pale yellow-green colour. The *D. squarrosus* from Nepal almost exactly resembles this, except in being thrice its size.

5. D. *glaucéscens,* Web. et Mohr, (*glaucous Didymodon*); stems rather short densely tufted slightly branched, leaves linear-lanceolate erecto-patent acute remarkably glaucous, capsule oblong erect, lid conico-rostrate. *Fl. Cr. Germ. p.* 158. *Grev. Scot. Cr. Fl. t.* 127. *Musc. Brit. ed.* 2. *p.* 116. *Suppl. t.* 3. — *Trichostomum glaucescens, Hedw. St. Cr. v.* 3. *t.* 37. *Fl. Brit. p.* 1245. *E. Bot. t.* 2381.

Scottish mountains, very rare. Glen of the Dole, Clova, on rocks slightly covered with earth. *Fr.* Aug. — Distinguished at once by its glaucus-green hue. The *peristome* is long, red, consisting of 32 filiform teeth, placed in pairs.

6. D. *Bruntóni,* Arn. (*Mr. Brunton's Didymodon*); stems elongated pulvinate branched, leaves lanceolato-subulate the margins slightly recurved scarcely serrated twisted when dry, capsule erect ovate, lid obliquely rostrate. *Arn. Disp. Musc. p.* 36. *Musc. Brit. ed.* 2. *p.* 117. *Suppl. t.* 4. — *D. obscurus, Kaulf.* — *Schwaegr. Suppl. v.* 2. *p.* 80. *t.* 125. *Grev. Scot. Cr. Fl. t.* 193. — *Dicranum Bruntoni, E. Bot. t.* 2509. — *D. polycarpon, Musc. Brit. ed.* 1. *p.* 57. *Drum. Musc. Scot. v.* 2. *n.* 37.

Rocks, in alpine districts. *Fr.* June. — This has very much the habit of *Weissia crispula;* but the peristome is truly that of a *Didymodon.* It has been well illustrated in the beautiful *Scottish Cr. Flora,* by *Dr. Greville,* who finds it abundantly on the Pentland hills, as *Mr. W. Wilson* does at Aber, N. Wales. The latter observes a slight appearance of a struma at the bottom of the capsule.

7. D. *rigídulus,* Hedw. (*rigid-leaved Didymodon*); stems elongated branched, leaves lanceolate carinate tapering upwards to a narrow point the margins reflexed entire, nerve rigid running beyond the point, capsule oblongo-ovate erect, lid rostrate. *Wils.* — *Hedw. St. Cr. v.* 3. *t.* 4. *Musc. Brit. ed.* 2. *p.* 117. *t.* 20. — *Trichostomum rigidulum, Fl. Brit. p.* 1238. *E. Bot. t.* 2178. *Turn. Musc. Hib. p.* 34. — *T. lineare, Fl. Brit. p.* 1240? *E. Bot. t.* 1598. — *Bryum lineare* and *B. rigidulum, Dicks.*

Walls and rocks. *Fr.* Sept. to March. — Mr. Turner well observes that the foliage of this moss much resembles that of *Tortula fallax;* but the nerve is different, singularly rigid, of a brown colour (as well as the leaves themselves), and decidedly running out beyond the point of the leaf: thus the stems have a bristly appearance from the stiffness and sharpness of the foliage. Near Beaumaris Mr. Wilson has observed a *var.* with a cylindrical capsule.

8. D. *trifárius*, Sw. (*three-ranked Didymodon*); leaves rather distant somewhat trifarious lanceolate obtuse carinate with the nerve scarcely reaching to the point, capsule oblongo-ovate erect, lid rostrate. *Musc. Suec. p.* 28. *Drum. Musc. Scot. v.* 2. *n.* 48. *Musc. Brit. ed.* 2. *p.* 118. *t.* 20.— *Swartzia trifaria, Hedw. St. Cr. v.* 2. *t.* 28.— *Cynontodium trifarium, Hedw. Sp. Musc.*— *Trichostomum trifarium, Fl. Brit. p.* 1236. *E. Bot. t.* 1707. — *T. linoides, Fl. Brit. p.* 1247. *E. Bot. t.* 2298. (*not of Dicks.*) *Dill. Musc. t.* 47. *f.* 39. (*according to Mr. Oglander.*)

On moist banks. *Fr.* Dec. and Jan.— This, it must be confessed, is very nearly allied to the last; and I have seen some plants so intermediate that I cannot pronounce with certainty upon them. It is best known by its shorter, more patent, far less rigid, more obtuse, more distantly placed, and somewhat trifarious leaves.

9. D. *crispulus*, (*obscure Didymodon*); stems short scarcely branched, leaves erect lanceolate-subulate with entire and slightly incurved margins channelled above concave and rounded at the summit, nerve suddenly inflexed towards the apex and excurrent, capsule oblongo-ovate erect, lid rostrate. *Wils.*— *Trichostomum crispulum, Bruch, in Un. It.*— *Didymodon reconditum, Wils. in E. Bot. Suppl. t.* 2734.

On maritime limestone rocks, near Carneg Onnen and Tros-y-Marian, Anglesea, and upon Ormeshead, Caernarvonshire, *Mr. W. Wilson. Fr.* May and June.—*Leaves* brownish, widest at the base, tapering upwards; *nerve* reddish and opaque. *Wils.*

10. D. *brachydóntius*, Wils. Mss. (*sharp-toothed Didymodon*); stems short scarcely branched, leaves widely spreading linear with plane margins bluntish entire, the nerve excurrent and slightly recurved towards the apex, capsule oblong-ovate, lid rostrate, peristome very short. *Wils. in E. Bot. Suppl. t.* 2739. — *Trichostomum brachydontium, Bruch, in Un. It.*

On maritime limestone rocks, near Carneg Onnen and Tros-y-Marian, Anglesea; and upon Ormeshead, Caernarvonshire, *Mr. W. Wilson. Fr.* June.— "*Stems* erect, tufted, branched, about an inch long. *Leaves* much spreading when wet, slightly inflexed and cortorted when dry, lanceolato-oblong, blunt, with a strong and considerably excurrent nerve, which is rather pellucid when the leaf is placed sideways under the lens; margin plane, entire; *nerve* of uniform colour with the substance of the leaf, which is composed of very minute cellules, of a lively green colour. *Capsule* ovato-oblong. *Fruitstalk* pale green.

The widely spreading, bright green, apiculate leaves and their closer texture, the broader capsule, pale fruitstalk, and the narrow appearance of the base of the leaf when dry, will serve to distinguish this from the *D. crispulus*, without inspection of the peristome, which it is very difficult to find. The broader blunt leaves and the excurrent nerve, with the pale white peristome, and perhaps the shortness of the lid, suffice to keep it distinct from *W. tenuirostris;* and probably the flaccid spreading stems, lax acuminated leaves, red somewhat torulose teeth of *W. tenuirostris*, may furnish additional characters. It is nearly allied to *Trichostomum flexisetum* of Bruch." *Wils.*

11. D. *capilláceus*, Schrad. (*fine-leaved Didymodon*); stems

elongated cæspitose, leaves nearly distichous subulato-setaceous, capsule erect ovato-cylindraceous, lid conical. *Schrad. Spicil. p.* 64. *Drum. Musc. Scot. v.* 1. *n.* 52. *Musc. Brit. ed.* 2. *p.* 119. *t.* 20.—*Swartzia capill. Hedw. St. Cr. v.* 2. *t.* 26.—*Cynontodium capill. Hedw. Sp. Musc.*—*Trichostomum capill. Fl. Brit. p.* 1236. *E. Bot. t.* 1152.—*Bryum capill. Dicks.*—*β. ithyphylla;* smaller, leaves shorter rigid more distichous. *D. subulatum, Schkuhr, Deutschl. Moose, p.* 65. *t.* 28.

Banks and rocks, in alpine situations ; upon walls about Blair, in Athol. *Fr.* Spring.

12. D. *longiróstris?* Web. et Mohr, (*long-beaked Didymodon*) ; stems elongated loosely cæspitose, leaves subulato-setaceous falcato-secund, seta incurved flexuose, capsule oblongo-cylindrical, lid rostrate. *Fl. Cr. Germ. p* 156. *and* 463.—*Cynodontium longirostre, Schwaegr. Suppl. v.* 1. *p.* 211. *t.* 29.

Moist shady rocks, in alpine situations, but always barren ; as on Ben-y-Gloe and Cairngorum. *Fr.* ——. — I introduce this plant with much hesitation under the above name ; because, though the stems and foliage entirely accord with those of authentic specimens of *D. longirostris*, yet the most important characters depend upon the fructification, which I have never seen on British individuals.

13. D. *heteromállus*, Hook. and Taylor, (*curve-leaved Grimmia*) ; stems rather short, leaves subsecund subulate, capsule ovato-cylindraceous, lid conical. *Musc. Brit. ed.* 2. *p.* 119. *Drum. Musc. Scot. v.* 1. *n.* 51.—*Weissia heterom. Hedw. St. Cr. v.* 1. *t.* 8.—*Grimmia heterom. Fl. Brit. p.* 1194. *E. Bot. t.* 1899. *Turn. Musc. Hib. p.* 30.—*β.* leaves more falcato-secund. *D. homomallus, Hedw. Sp. Musc. t.* 23. *f.* 1—7.—*Grimmia homomalla, Fl. Brit. p.* 1194. *E. Bot. t.* 1900.—*Bryum Weissia, Dicks.*

On the earth, especially in mountainous districts. *Fr.* Summer. — The reasons for considering the *Weissia homomalla*, Hedw., to be the same as our *Didym. heteromallus*, are given in the *Musc. Brit.* This species is remarkable for its crowded mode of growth, yellowish leaves, pale fruit-stalks, which latter become redder upwards, especially as the plant advances to maturity.

14. D. *pusíllus*, Hedw. (*dwarf Didymodon*) ; stems slender elongated, leaves erect rigid from a broad lanceolate base subulate, capsule erect oblong, lid obliquely rostrate. *Hedw. Sp. Musc. p.* 104. *Web. et Mohr, Fl. Cr. Germ. p.* 157.—*Trichostomum pusillum, Hedw. St. Cyr. v.* 1. *t.* 28. *E. Bot. t.* 2380.—*Bryum pusillum. Dicks.*

" Sandy ground," *Mr. Dickson, in E. Bot.* Bank (since destroyed), three miles from Belfast, on the Dublin road ; and in the garden of J. Templeton, Esq., near Belfast, *Mr. Drummond. Fr.* Spring. — The short upright rather rigid *leaves*, with their broad and lanceolate base, distinguish the present species from the preceding, than which it is much smaller. No certain station had been known of this rare plant, in Britain, till Mr. Drummond gathered the specimens now before us in Ireland.

15. D. *cylindricus*, (*cylindrical Didymodon*); stem short simple, leaves from a broad base setaceo-capillary spreading on all sides flexuose, capsule cylindrical inclined, lid conical blunt.—*Trichostomum cylindr. Hedw. Sp. Musc. p.* 107. *t.* 24. *f.* 7—13. *Wahl. Lapp. p.* 332.—*Dicranum cylindricum, Web. et Mohr.*

Ditch bank, near Orange Grove, Belfast, *Mr. Drummond. Fr.* Nov. — For the addition of this species likewise to the British list, we are indebted to Mr. Drummond. It is entirely distinct from any other of this country, and bears fruit very sparingly in the station just mentioned.

17. Trichóstomum. *Hedw.* Fringe-Moss.

Seta terminal. *Peristome* single, of 16 equal *teeth* divided to the base, or 32 placed together in pairs. *Calyptra* mitriform. (*Musc. Brit. t.* 2.)—Named from θριξ, *a hair*, and στομα, the *mouth*, on account of the slender capillary teeth at the mouth of the capsule.

* *Fruitstalks curved.*

1. T. *pátens*, Schwaegr. (*spreading Fringe-Moss*); stems elongated procumbent, leaves lanceolate acuminate carinated their margins recurved, fruitstalks curved, capsule oblongo-ovate furrowed, lid rostrate. *Schwaegr. Suppl. v.* 1. *p.* 152. *t.* 37. *Drum. Musc. Scot. v.* 1. *n.* 43. *Musc. Brit. ed.* 2. *p.* 104. *t.* 19. (excl. var. β.)—*Dicranum patens, Fl. Brit. p.* 1213. *E. Bot. t.* 1900.—*Bryum patens, Dicks. Cr. Fasc.* 4. *t.* 4. *f.* 8. *Dill. Musc. t.* 17. *f.* 30.

Rocks in mountainous regions, frequent. *Fr.* Summer. — The upper *leaves* are sometimes slightly piliferous at the points.

2. T.? *funále*, Schwaegr. (*cord-like Fringe-Moss*); stems elongated ascending, leaves lanceolate acuminate carinated their margins recurved hair-pointed, fruitstalks curved, capsule oblong-ovate furrowed, lid rostrate, teeth often cleft only at the point. *Schwaegr. Suppl. v.* 1. *p.* 150. *t.* 37.—*T. patens*, β. *Musc. Brit. ed.* 2. *p.* 104.

Rocks, rather scarce. Argyleshire, *Capt. Carmichael.* Clova, *Mr. T. Drummond.* Near Plymouth, and near Penzance, *Rev J. S. Tozer. Fr.* Summer. — I agree with my valued correspondent last mentioned, that this is a very puzzling moss. That gentleman has shown the *peristome* to be very different from that of *T. patens*, with which I had united it, and indeed that in many respects it is more allied to *Grimmia trichophylla;* but it is much stouter in all its parts, and has the *leaves* more lax.

** *Fruitstalks straight.*

3. T. *lanuginósum*, Hedw. (*woolly Fringe-Moss*); stems elongated subpinnate, leaves lanceolato-subulate acuminate their long diaphanous points serrated, margins recurved, capsule ovate, fruitstalks short on lateral branches, lid rostrate. *Hedw. St. Cr. v.* 3. *t.* 2. *Turn. Musc. Hib. p.* 38. *Fl. Brit. p.* 1240.

E. Bot. t. 1348. *Drum. Musc. Scot. v.* 2. *n.* 44. *Musc. Brit. ed.* 2. *p.* 105. *t.* 19.—*Bryum hypnoides, a. Linn.*—*Dill. Musc. t.* 47. *f.* 32.

On mountains, abundant; rare on heaths in the plains; as in Norfolk, *Rev. James Layton.*—The *stems* are sometimes a foot or more in length, and have an irregularly pinnated appearance.

4. T. *canéscens,* Hedw. (*hoary Fringe-Moss*); stems elongated irregularly branched, leaves ovato-lanceolate their diaphanous acuminated points slightly serrated, capsule ovate, teeth of the peristome very long and filiform, lid subulate. *Hedw. St. Cr. v.* 3. *t.* 5. *Turn. Musc. Hib. p.* 39. *Fl. Brit. p.* 1242. *E. Bot. t.* 2434. *Drum. Musc. Scot. v.* 1. *n.* 44. *Musc. Brit. ed.* 2. *p.* 106. *t.* 19. *Dill. Musc. t.* 47. *f.* 27. *B.*—*β.* with numerous short pinnated branches. *T. ericoides, Schrad.*—*Turn. Musc. Hib. p.* 28. *Fl. Brit. p.* 1241. *E. Bot. t.* 1991. *Schwaegr. Suppl. v.* 1. *t.* 38.—*Bryum ericoides, Dicks. Cr. Fasc.* 4. *p.* 14. —*B. hypnoides, γ. Linn.*—*Dill. Musc. t.* 47. *f.* 31.

On heaths and stony places in mountainous countries, frequent. *Fr.* Winter and Spring. — The *β.*, though very different at the first aspect, can scarcely be considered otherwise than as a *var.* of the present, having numerous short pinnated branches.

5. T. *heteróstichum,* Hedw. (*serrated hoary Fringe-Moss*); stems elongated branched, leaves ovato-lanceolate their diaphanous points slightly serrated, capsule cylindrical, teeth of the peristome rather short, lid rostrate. *Hedw. St. Cr. v.* 2. *p.* 25. *Turn. Musc. Hib. p.* 37. *Fl. Brit. p.* 1239. *E. Bot. t.* 1347. *Musc. Brit. ed.* 2. *p.* 106. *t.* 19.—*Bryum heterostichum, Dicks.*—*Dill. Musc. t.* 47. *f.* 27. *A. and F. and G.*

On stones, in mountainous districts. *Fr.* Spring.—Similar as are the *stems* and *foliage* of the present plant to the last, yet the *fruit* is very different, the *capsule* being much narrower and longer; the *teeth* are shorter, and almost resemble those of a *Dicranum,* but are more deeply cleft.

6. T. *microcárpum,* Hedw. (*small-fruited hoary Fringe-Moss*); stems elongated branched, leaves lanceolate their diaphanous acuminated points slightly serrated, capsule ovate, teeth of the peristome rather short, lid rostrate. *Hedw. Sp. Musc. t.* 23. *f.* 8—12. *Turn. Musc. Hib. p.* 40. *Fl. Brit. p.* 1243. *E. Bot. t.* 1440. *Drum. Musc. Scot. v.* 2. *n.* 45. *Musc. Brit. ed.* 2. *p.* 107. *t.* 19.—*Dill. Musc. t.* 47. *f.* 29.—*T. sudeticum, Funck, Deutsch. Moose, t.* 18. *n.* 15. *Drum. Musc. Amer. v.* 1. *n.* 129.

On rocks. *Fr.* March. — Sometimes all the tips of the *leaves* are coloured; and when that is the case, and the plant is small, it corresponds probably with Mr. Turner's *Dicranum aciculare, γ.* Whether our plant be that of Hedwig I am doubtful; for the *capsules* figured in the *Sp. Musc.* are almost elliptical. The *T. microcarpum* of Funck, and of Drummond's *Musci Americani, v.* 1. *n.* 129, is certainly another species: and their *T. sudeticum* is our *microcarpum.*

†† *Leaves never diaphanous at their points.*

7. T. *aciculáre*, Beauv. (*dark Mountain Fringe-Moss*); stems elongated branched, leaves lanceolate obtuse serrulate at the points their nerve vanishing before the summit, capsule oblong, lid rostrate. *Hook. Scot. P. II. p.* 35. *Drum. Musc. Scot. v.* 1. *n.* 46. *Musc. Brit. ed.* 2. *p.* 107. *t.* 19.—*Dicranum aciculare, Hedw. St. Cr. v.* 3. *t.* 33. *Turn. Musc. Hib. p.* 67. *Fl. Brit. p.* 1212. *E. Bot. t.* 1978.—*Trich. riparium, Web. et Mohr.—Dill. Musc. t.* 46. *f.* 25, *and* 26. *B.*

On wet rocks, frequent. *Fr.* Spring. — This moss has the *leaves* singularly obtuse, and when growing in the water almost black. Sometimes the foliage is secund. The *T. riparium*, figured in *Schwaegr. Suppl. v.* 1. *t.* 39., seems scarcely different from this.

8. T. *fasciculáre*, Schrad. (*beardless hoary Fringe-Moss*); stems elongated branched, leaves lanceolate entire their summits never diaphanous their margins recurved, capsule ovato-oblong, lid rostrate. *Schwaegr. Suppl. v.* 1. *t.* 38. *Turn. Musc. Hib. p.* 39. *Fl. Brit. p.* 1243. *E. Bot. t.* 2005. *Drum. Musc. Scot. v.* 1. *n.* 47. *Musc. Brit. ed.* 2. *p.* 108. *t.* 19.—*Bryum hypnoides, β. Linn.—Dill. Musc. t.* 47. *f.* 28. *and t.* 46. *f.* 26. *C.*

On rocks, in mountainous districts. *Fr.* Spring. — *Stems* from 1—3 inches long, with acute entire *leaves* of a yellowish green colour, by which it is readily distinguished from the preceding; as it is by the want of the diaphanous serrulated points from *T. canescens* and its allies.

9. T. *polyphýllum*, Schwaegr. (*many-leaved FringeMoss*); stems tufted branched, leaves lanceolato-subulate their margins recurved serrated above very much crisped when dry, capsule oblong, lid rostrate. *Schwaegr. Suppl. v.* 1. *t.* 39. *Drum. Musc. Scot. v.* 1. *n.* 49. *Musc. Brit. ed.* 2. *p.* 108. *t.* 19.—*T. cirratum, Fl. Brit. p.* 1239.—*Dicranum polyphyllum, E. Bot. t.* 1217. —*Bryum polyph. Dicks.—Dill. Musc. t.* 48. *f.* 41.

Walls and rocks, in alpine districts. *Fr.* Spring. — This is a plant very distinct from all others of the genus; its *leaves* are long and narrow, and remarkably crisped when dry. It forms dense rounded tufts, generally of a dark green colour, and loves to grow on the perpendicular sides of stone walls, especially of trap. The *capsules* are numerous, light pale brown; the *teeth* bright red, connected in filiform pairs.

10. T. *ellípticum*, Hook. and Taylor, (*elliptical Fringe-Moss*); stems short nearly simple, leaves lanceolate acuminate straight their nerve broad their margins plane, capsule elliptical, lid rostrate. *Musc. Brit. ed.* 2. *p.* 109. *t.* 19. *Drum. Musc. Scot. v.* 1. *n.* 48.—*Dicranum ellipticum, Turn. Musc. Hib. p.* 76. *t.* 6. *Fl. Brit. p.* 1213. *E. Bot. t.* 1901. *Schwaegr. Suppl. v.* 1. *t.* 47. —*Grimmia elliptica, Arn. Disp. Musc. p.* 21.

Alpine rocks, Ireland, and more frequently in Scotland. Wales, *Mr. W. Wilson.* *Fr.* Spring. — The *capsules* of this moss have a very neat

and polished appearance. The *teeth* are broad, often cleft, as in some *Dicrana*, which the peristome in other respects resembles.

18. Glyphomítrion. *Brid.* Glyphomitrion.

Seta terminal. *Caps.* without an apophysis. *Peristome* single, of 16 *teeth* approximated in pairs, reflexed when dry. *Calyptra* furrowed, covering the whole capsule, entire or rarely cleft on one side and laciniated.—Named from γλυφω, to *sculpture*, and μιτριον, a *little mitre*, on account of the furrowed calyptra.

1. G. *Daviésii*, Brid. (*Mr. Davies' Glyphomitrion*). *Schwaegr. Suppl. v.* 3. *t.* 113. *Hook. and Grev. in Ed. Journ. of Sc. v.* 1. *p.* 131. *Musc. Brit. ed.* 2. *p.* 110. *t.* 13.—*Grimmia Daviesii, Turn. Musc. Hib. p.* 24.—*Encalypta Daviesii, E. Bot. t.* 1281. —*Griffithia Daviesii, Br. in Linn. Tr. v.* 12. *p.* 575.

On rocks, generally near the sea, particularly in Wales and Ireland. Rocks at Kilpatrick on the Clyde, *Mr. T. Drummond. Fr.* March. — *Stems* about half an inch in height, tufted, resembling small plants of *Trichostomum polyphyllum*. *Leaves* lanceolato-acuminate, carinate, entire, of a dark brownish-green colour, much crisped when dry ; those of the *perichætium* broad and convolute. *Capsule* turbinate, beautifully smooth and regular in its form, brown. *Lid* shortly conical, with a rather long and sharp *beak*. — This moss is peculiar to the British Isles.

19. Dícranum. *Hedw.* Fork-moss.

Seta terminal (except in *D. adiantoides* and *D. taxifolium*). *Peristome* single, of 16 bifid, equidistant *teeth*. *Calyptra* dimidiate. (*Musc. Brit. t.* 2.)—Named from δικρανον, a *flesh-hook or fork*, from the resemblance of its forked teeth to that instrument.—The first division of *Dicranum*, with distichous leaves, does indeed form a natural groupe or genus, but possessing no character in the fructification.

A. *Leaves bifarious* (Fissidens, *Hedw.*)

1. D. *bryoides*, Sw. (*lesser pinnated-leaved Fork-moss*); seta terminal, leaves of the perichætium resembling those of the stem. *Musc. Brit. ed.* 2. *p.* 88. *t.* 16.—*α.* stem short simple, capsule erect. *D. bryoides, Sw. Musc. Suec. t.* 2. *f.* 4. *Fl. Brit. p.* 1232. *E. Bot. t.* 625. *Turn. Musc. Hib. t.* 53. *Drum. Musc. Scot. v.* 2. *n.* 38.—*Fissidens bryoides, Hedw. St. Cr. v.* 3. *t.* 29.—*Hypnum bryoides, Linn.*—*Dicr. viridulum, Sw. Musc. Suec. t.* 2. *f.* 3. *Fl. Brit. p.* 1230. *E. Bot. t.* 1368.—*Bryum viridulum, Linn.*—*Dicks. Cr. Fasc.* 1. *t.* 1. *f.* 5.—*Fissidens exilis, Hedw. Sp. Musc. t.* 38. *f.* 7—9.—*β.* stem elongated somewhat branched, capsule erect. *D. osmundioides, Turn. Musc. Hib. p.* 55. *Fl. Brit. p.* 1233. *E. Bot. t.* 1662.—*Fissidens osmund. Hedw. Sp. Musc. t.* 40. *f.* 7—11.—*F. asplenioides, Schwaegr. Suppl. v.* 1. *P. II. p.* 8. *Brid. Meth. Musc. p.* 190. (*and of the same author, according to Mr. Arnott, F. elegans, Thun-*

bergii, dicarpos and acacioides).—*Hypnum asplenioides, Dicks. Cr. Fasc.* 2. *t.* 5. *f.* 5.—γ. stem short simple, capsule inclined. *D. tamarindifolium, Turn. Musc. Hib. p.* 55. *Fl. Brit. p.* 1231.—*F. incurvus, Schwaegr. Suppl. t.* 49.—*Fissidens tamarindifolius, crispus, longifolius and linearis, Brid.—F. palmatus, Hedw. St. Cr. v.* 3. *t.* 30. *A.* ?

Moist banks and in woods, frequent. β. frequent on moist rocks. *Fr.* Winter. — A very variable plant, from which the *D. osmundioides* of authors does indeed at first sight appear to be distinct; for the *stems* are elongated, branched, almost erect, with yellowish foliage: yet I see no reason to consider it other than as a *variety;* though in this opinion I am at variance with most Muscologists, especially the continental ones. The structure of the *leaves* in this and the remaining species of this division is highly curious, and totally unlike that of any other moss with which I am acquainted. Besides being vertical, their upper half (taking the nerve for the line of separation) is from the base beyond the middle composed of two lamellæ, the lower part of which embraces the stem, while the rest often embraces a portion of the leaf placed immediately above it.

The moss which engaged Mungo Park's attention so much in Africa as to revive his drooping spirits when sinking under fatigue, is this species; as I have ascertained by means of original specimens given to me by his brother-in-law, Mr. Dickson.

2. D. *adiantoides,* Sw. (*Adiantum-like Fork-Moss*); seta lateral, perichætial leaves ovate slightly convolute pointed. *Sw. Musc. Suec. p.* 31. *Turn. Musc. Hib. p.* 57. *Fl. Brit. p.* 1234. *Hobs. Brit. Mosses, v.* 2. *n.* 34. *Drum. Musc. Scot. v.* 1. *n.* 32. *Musc. Brit. ed.* 2. *p.* 90. *t.* 16.—*Fissidens adiantoides, Hedw. St. Cr. v.* 3. *t.* 36. *Schwaegr. Suppl. v.* 1. *P. II. p.* 10. *Brid. Meth. p.* 191. *together with F. grandiflorus of the same author and F. dubius, Beauv.—Hypnum adiant. Linn.—E. Bot. t.* 264.—*Dill. Musc. t.* 34. *f.* 3.

Moist banks, wet pastures, and bogs. *Fr.* Spring. — *Leaves* nearly lanceolate, more or less serrulate at the point. The base of the *setæ* is surrounded by a remarkably scaly *perichætium,* whose *leaves* are very unlike those of the *stem,* being ovate, concave, convolute, nerveless, except at the revolute point, which is flattened and its edge vertical. These are inserted on the side of the stem, and from below the perichætium reddish roots are thrown out, exactly as in the following species, from which it scarcely differs but in the situation of the *fruit,* and of which Wahlenberg considers it a variety.

3. D. *taxifólium,* Sw. (*Yew-leaved Fork-Moss*); seta arising from the root, perichætial leaves ovate sheathing convolute pointed. *Sw. Musc. Suec. p.* 31. *Turn. Musc. Hib. p.* 56. *Fl. Brit. p.* 1233. *Hobs. Br. Mosses, v.* 1. *n.* 35. *Drum. Musc. Scot. v.* 1. *n.* 31. *Musc. Brit. ed.* 2. *p.* 91. *t.* 16.—*Fissidens taxif. Hedw. Sp. Musc. t.* 39. *Schwaegr. Suppl. v.* 1. *P. II. p.* 10.—*Hypnum, Linn.—E. Bot. t.* 416.—*Dill. Musc. t.* 34. *f.* 2.

Moist banks. *Fr.* Winter.

B. *Leaves inserted on all sides of the stem.*

a. *Leaves destitute of nerve.*

4. D. *gláucum*, Hedw. (*white Fork-Moss*); stems branched fastigiate, leaves lanceolate straight nerveless entire, capsule ovate cernuous, lid rostrate. *Hedw. Sp. Musc. p.* 135. *Schwaegr. Suppl. v.* 1. *p.* 187. *t.* 48. *Turn. Musc. Hib. p.* 73. *Fl. Brit. p.* 1216. *E. Bot. t.* 2166. *Hobs. Br. Mosses, v.* 1. *n.* 36. *Musc. Brit. ed.* 2. *p.* 92. *t.* 16.—*Bryum glaucum, Linn.*—*Dill. Musc. t.* 46. *f.* 20, and *t.* 83. *f.* 8.

Boggy woods and heaths, frequent; rare in fruit. *Fr.* Spring.—The colour and reticulation of the *leaves* of this plant resemble those of the Genus *Sphagnum*.

b. *Leaves furnished with a nerve.*

* *Leaves apiculate or piliferous.*

5. D. *latifólium*, Hedw. (*broad-leaved Fork-Moss*); stems short, leaves oblong concave entire apiculate or piliferous, capsule erect ovato-oblong, lid rostrate. *Hedw. St. Cr. v.* 1. *t.* 33. *Turn. Musc. Hib. p.* 79. *Hobs. Br. Mosses, v.* 2. *n.* 32. *Musc. Brit. ed.* 2. *p.* 92. *t.* 16.—*Trichostomum latif. Schwaegr. Suppl. v.* 1. *p.* 145.— *T. piliferum, E. Bot. t.* 2536.—*Desmatodon latif. Brid. Bryol.*—*Bryum piliferum, Dicks.*

Banks in Ireland; 4 miles from Dublin on the road to Woodlands, Luttrelstown, *Dr. Taylor.* Near Aberfeldy, Scotland, *Mr. Dickson*, chiefly in mountainous situations. *Fr.* ——.—Sometimes the *nerve* is so far produced beyond the point of the *leaf* and so diaphanous as to render the latter truly piliferous.

** *Leaves not apiculate.*

† *Nerve very broad.*

6. D. *longifólium*, Hedw. (*long-leaved Fork-Moss*); stems elongated, leaves very long subulato-setaceous falcato-secund serrulate their nerve very broad, capsule oblongo-ovate nearly erect, lid rostrate. *Hedw. St. Cr. v.* 3. *t.* 9. *Schwaegr. Suppl. v.* 1. *p.* 176. *Musc. Brit. ed.* 2. *p.* 93. *t.* 16.

Wet rocks, Glenmalur, Ireland, *Dr. Taylor.* On Ben Voirlich and Ben-y-gloe, Scotland. *Fr.* ——.—The *leaves* of this moss are remarkably long and slender and furnished with a *nerve* which occupies nearly their whole breadth. I am not aware that its fruit has been found in Britain.

7. D. *cerviculátum*, Hedw. (*red-necked Fork-Moss*); stems short, leaves lanceolato-subulate entire subsecund their nerve very broad, capsule ovate subcernuous strumose, lid rostrate. *Hedw. St. Cr. v.* 3. *t.* 37. *Turn. Musc. Hib. p.* 64. *Fl. Brit. p.* 1220. *Hobs. Br. Mosses, v.* 1. *n.* 37. *Schwaegr. Suppl. v.* 1. *p.* 193. *E. Bot. t.* 1861. *Drum. Musc. Scot. v.* 1. *n.* 37. *Musc. Brit. ed.* 2. *p.* 93. *t.* 16.—*D. pusillum, Hedw. St. Cr. v.* 2. *t.* 29. *Fl. Brit. p.* 1219. *E. Bot. t.* 2491. *Schwaegr. Suppl. v.* 1.

p. 193.—*D. flavidum*, *Schwaegr. Suppl. v.* 1. *p.* 192. *t.* 45.—*D. uncinatum*, *Fl. Brit. p.* 1207. *E. Bot. t.* 2261.—*D. sudeticum*, *Schwaegr. Suppl. v.* 1. *p.* 175. *t.* 45.—*Bryum uncinatum*, *cerviculatum* and *parvulum*, *Dicks.*—*Oncophorus*, *Brid.*

Bogs and moist banks, sides of drains, &c. *Fr.* June.—This is a small moss of a yellowish colour, covering with its dense tufts the black soil of turf-bogs;—but Mr. Wilson finds in Cheshire a moss twice the size of this, having the habit of *D. heteromallum*, but the remarkably broad nerve to the leaf of the true *D. cerviculatum*.

8. D. *flexuósum*, Hedw. (*zigzag Fork-Moss*); stems nearly simple rigid, leaves lanceolato-subulate much acuminated straight their nerve very broad, seta flexuose, calyptra fringed at the base, capsule ovate at length striated, lid rostrate. *Hedw. Sp. Musc. t.* 38. *Turn. Musc. Hib. p.* 74. *E. Bot. t.* 1491. *Fl. Brit. p.* 1229. *Hobs. Br. Mosses*, *v.* 1. *n.* 38. *Schwaegr. Suppl. v.* 1. *p.* 189. *Musc. Brit. p.* 94. *t.* 16.—*Bryum fluxuosum*, *Linn.*—*Thysanomitrion flex. Arn. Disp. Musc. p.* 33.—*Campylopus flex. Brid.*—*Bryum immersum* and *B. fragile*, *Dicks.*—*β. nigro-viride;* stems elongated blackish-green, leaves often piliferous. *Campylopus pilifer*, *Brid.*—*Sphagnum alpinum*, *Linn.*—*Dill. Musc. t.* 47. *f.* 33. and *t.* 32. *f.* 3.

On turf-bogs and wet rocks. *β.* in alpine situations. *Fr.* Winter.—This is a highly valuable species, when growing in the plains having short *stems* and pale yellow *leaves*, which are so fragile as frequently to be found broken off and lying upon the tuft in considerable quantities, looking at first sight not unlike the dimidiate *calyptræ* of the genus—and hence the *Bryum fragile* of Dicks. The alpine state of the plant is sometimes 4—5 inches in length, usually of a blackish colour, with diaphanous points to the *leaves*, rarely bearing fructification. Specimens with falcate leaves have been gathered near Killarney by *Mr. Wilson*.

†† *Nerve narrow.*

* *Capsule with a struma.*

9. D. *vírens*, Hedw. (*green spur-fruited Fork-Moss*); stems elongated, leaves from a broad sheathing base subulate their margins recurved crisped when dry pointing in all directions, capsule smooth oblongo-cylindrical subcernuous strumose, lid rostrate. *Hedw. St. Cr. v.* 3. *t.* 32. *Turn. Musc. Hib. p.* 69. *Fl. Brit. p.* 1406. *E. Bot. t.* 1462. *Schwaegr. Suppl. v.* 1. *p.* 194. *Drum. Musc. Scot. v.* 2. *n.* 41. *Musc. Brit. ed.* 2. *p.* 95. *t.* 17.—*Oncophorus*, *Brid.*

Marshy places upon the more elevated mountains of Scotland, especially on Ben Lawers. Ireland, *Dr. Scott. Fr.* June.—British specimens differ from continental ones by having longer and entire points to the *leaves*.

10. *D. Schreberiánum*, Hedw. (*Schreberian Fork-Moss*); stems rather short simple tufted, leaves squarrose from a very broad sheathing base suddenly subulate crisped when dry, capsule ovate subcernuous, struma distinct, lid rostrate curved. *Hedw.*

Sp. Musc. p. 144. *t.* 33. *Schwaegr. Suppl. v.* 1. *p.* 179. *Grev. Scot. Cr. Fl. t.* 116. *Musc. Brit. ed.* 2. *p.* 95. *Suppl. t.* 3.

Upon clayey soil, in an old neglected road in Glen Tilt at the foot of Ben-y-gloe, *Greville*, *Arnott*, and *Hooker*, 1822. *Fr.* Aug. — This has the mode of growth of *D. varium* and the squarrose foliage of *D. squarrosum;* but the whole plant is much smaller, the *leaves* narrow with remarkably broad sheathing bases, and the *capsule* has a distinct *struma.*

11. D. *strumíferum*, Ehrh. (*strumose Fork-Moss*); stems elongated, leaves from a broad sheathing base subulate entire their margins plane crisped when dry, pointing in all directions, capsule furrowed oblongo-ovate subcernuous strumose, lid rostrate. *Ehrh. Crypt. n.* 74. *Fl. Brit. p.* 1298. *E. Bot. t.* 2410. *Drum. Musc. Scot. v.* 2. *n.* 42. *Schwaegr. Suppl. v.* 1. *p.* 194. *Musc. Brit. ed.* 2. *p.* 96. *t.* 17. — *Fissidens strumifer, Hedw. St. Cr. v.* 2. *t.* 32. — *Bryum inclinans, Dicks.* — *Oncophorus, Brid.*

Marshy places, in alpine situations. *Fr.* Autumn. — Allied to *D. virens;* but the margins of the *leaves* are not recurved, and the *capsule* is shorter and deeply furrowed.

12. D. *polycárpon*, Ehrh. (*many-headed Fork-Moss*); stems elongated branched, leaves patent pointing in all directions lanceolato-subulate their margins recurved flexuose subserrulate crisped when dry, capsule oblongo-ovate nearly erect furrowed when old, struma inconspicuous, lid rostrate. *Ehrh. Crypt. n.* 84. (*according to Smith*). *Fl. Brit. p.* 1227. *E. Bot. t.* 2269. *Schwaegr. Suppl. v.* 1. *p.* 179. *Musc. Brit. ed.* 2. *p.* 96. *t.* 18. — *Fissidens polycarpus, Hedw. St. Cr. v.* 2. *t.* 31. (*not good.*) — *Oncophorus, Brid.*

Alpine rocks, rare. Ben High, Aberdeenshire, *Mr. G. Don. Fr.* Aug. — Were it not for the obscure *struma* and the narrow recurved margin of the *leaves*, I should be inclined to reduce this plant to *D. strumiferum:* indeed I have seen some specimens so intermediate that I have scarcely known to which I ought to refer them.

13. D. *falcátum*, Hedw. (*sickle-leaved Fork-Moss*); stems nearly simple, leaves long lanceolato-subulate falcato-secund nearly entire, capsule ovate subcernuous strumose, lid rostrate. *Hedw. Sp. Musc. t.* 32. *f.* 1—7. *Fl. Brit. p.* 1208. *E. Bot. t.* 1989. *Schwaegr. Suppl. v.* 1. *p.* 190. *Hobs. Brit. Mosses, v.* 2. *n.* 33. *Drum. Musc. Scot. v.* 1. *n.* 36. *Musc. Brit. ed.* 2. *p.* 97. *t.* 17. — *Bryum longifolium, Dicks.* — *Oncophorus, Brid.*

Alpine rocks. *Fr.* June. — Allied to *D. heteromallum;* but it is more rigid, the *leaves* more falcate, and there is an evident *struma.* Mr. Wilson was struck with the sooty hue of the *calyptra* of this species, on the summit of Ben Lawers. This I have often observed, and have always attributed it to the effect of the snow which covers the plant even during a great portion of the summer, in those elevated regions.

14. D. *Stárkii*, Web. et Mohr, (*Starkian Fork-Moss*); stems somewhat branched, leaves lanceolato-subulate falcato-secund entire, capsule oblongo-ovate suberect strumose, lid rostrate. *Web. et Mohr, Fl. Cr. Germ. E. Bot. t.* 2227. *Schwaegr.*

Suppl. v. 1. *p.* 194. *t.* 46. *Drum. Musc. Scot. v.* 1. *n.* 35. *Musc. Brit. ed.* 2. *p.* 97. *t.* 17. — *Oncophorus, Brid.*

Alpine rocks. *Fr.* July. — Similar in many respects to the preceding; but generally larger, sometimes 4 or 5 inches long, with a longer *capsule*. There is, too, a *perichætium* whose *leaves* are convolute, as in *D. scoparium*.

** *Capsule without a struma.*

15. D. *flavéscens*, Sm. (*yellowish Fork-Moss*); stems branched, leaves long lanceolate serrulate pointing in all directions crisped when dry, capsule oblong erect, lid rostrate. *E. Bot. t.* 2263. *Fl. Brit. p.* 1224. *Drum. Musc. Scot. v.* 2. *n.* 40. *Musc. Brit. ed.* 2. *p.* 98. *t.* 17. — *D. gracilescens, Web. et Mohr.* — *Schwaegr. Suppl. v.* 1. *p.* 180. *t.* 46. — *Bryum flavescens, Dicks.*

On wet sand, under the rocky banks of rivers. *Fr.* Aug.

16. D. *squarrósum*, Schrad. (*drooping-leaved Fork-Moss*); stems somewhat branched, leaves from a broad sheathing base lanceolate obtuse recurved and patent directed to every side crisped when dry, capsule ovate subcernuous, lid rostrate. *Schrad. Journ.* 1802. *Turn. Musc. Hib. p.* 69. *Fl. Brit. p.* 1225. *Schwaegr. Suppl. v.* 1. *p.* 182. *t.* 47. *E. Bot. t.* 2004. *Hobs. Brit. Mosses, v.* 1. *n.* 39. *Drum. Musc. Scot. v.* 1. *n.* 41. *Musc. Brit. ed.* 2. *p.* 98. *t.* 17. — *Bryum palustre, Dicks.* — *Oncophorus, Brid.* — *Dill. Musc. t.* 46. *f.* 24.

Wet spongy plains, in rocky alpine situations; bearing *fruit* (July) rarely, and usually in sandy deposits by the sides of streams; as in the Dublin mountains, *Dr. Taylor;* and Castle Kelly Glen, Ireland, *Wils.*; in the Isle of Skye, &c. *Fr.* August. — Some authors arrange this with the strumiferous *Dicrana* (*Oncophorus, Brid.*); but to me the *struma* is so obscure that I think the plant ranks more naturally in the present group. Mr. Wilson, too, observes that there is no real struma, only the appearance of one, from the shrinking of the capsule, when dry, below the middle.

17. D. *pellúcidum*, Sw. (*pellucid Fork-Moss*); stems branched, leaves lanceolate their margins slightly waved serrated rather obtuse pointing in all directions, capsule ovate subcernuous, lid rostrate. *Sw. Musc. Suec. p.* 35. *Turn. Musc. Hib. p.* 68. *Fl. Brit. p.* 1223. *E. Bot. t.* 1346. *Schwaegr. Suppl. v.* 1. *p.* 181. *t.* 48. *Hobs. Br. Mosses, v.* 1. *n.* 40. *Drum. Musc. Scot. v.* 1. *n.* 42. *Musc. Brit. ed.* 2. *p.* 98. *t.* 17. — *Bryum pellucidum, Linn.* — *Dill. Musc. t.* 46. *f.* 23.

Sides of streams and rivers. *Fr.* Nov. — The more ovate, shorter, somewhat truncate and decidedly inclined *capsules*, furnish the principal distinction between this plant and *D. flavescens*.

18. D. *spúrium*, Hedw. (*spurious Fork-Moss*); stems elongated, leaves ovate concave erecto-patent directed to every side the upper ones lanceolate serrulate, capsule oblong curved, lid rostrate. *Hedw. St. Cr. v.* 2. *t.* 20. *Fl. Brit. p.* 1222. *Schwaegr. Suppl. v.* 1. *p.* 179. *Musc. Brit. ed.* 2. *p.* 99. *t.* 17.

Bogs, Yorkshire, *Mr. Teesdale.* Kinnordy, Scotland, *C. Lyell, Esq.;* always sterile. *Fr.* ——. — The *teeth* of the *peristome* of this and some other *Dicrana* have sometimes 3 segments.

19. D. *crispum,* Hedw. (*curl-leaved Fork-Moss*); stems short, leaves from a sheathing base setaceous nearly distichous flexuose recurved crisped when dry, capsule ovate erect, lid with a long beak. *Hedw. St. Cr. v.* 2. *t.* 33. *Turn Musc. Hib. p.* 65. *Fl. Brit. p.* 1207. *E. Bot. t.* 1151. *Schwaegr. Suppl. v.* 1. *p.* 179. *Drum. Musc. Scot. v.* 1. *n.* 38. *Hobs. Br. Mosses, v.* 2. *n.* 34. *Musc. Brit. ed.* 2. *p.* 100. *t.* 17.—*Bryum vaginale, Dicks.*

Moist banks. *Fr.* Nov. — In size and general appearance, this is allied to *D. Schreberianum;* but that has shorter and broader *leaves,* an inclined *capsule,* and shorter *lid.*

20. D. *flagellare,* Hedw. (*upright-fruited Fork-Moss*); stems branched, leaves subulate their margins plane subserrated more or less crisped when dry, capsule cylindrical nearly erect equal, lid with a very long beak.—*a.* leaves falcato-secund. *D. flagellare, Hedw. St. Cr. v.* 3. *t.* 1. *Fl. Brit. p.* 1206. *E. Bot. t.* 1977. (*left-hand figure*).—*β.* leaves directed to every side. *D. Scottianum, Turn. Musc. Hib. p.* 75. *t.* 6. *f.* 1. *Fl. Brit. p.* 1226. *E. Bot. t.* 1391. *and t.* 1977. (*right-hand figure, as D. flagellare*). *Hobs. Br. Mosses, v.* 2. *n.* 35. *Musc. Brit. ed.* 2. *p.* 100. *t.* 18.—*D. montanum, Hedw. Sp. Musc. p.* 145. *t.* 35. *f.* 8—13? *Fl. Brit. p.* 1228.—*D. strictum, Schwaegr. Suppl. t.* 43. *v.* 1. *p.* 188.

Among rocks, in mountainous situations, especially in the South of Ireland, where *Mr. Wilson* finds both *a.* and *β.* Near Llanberis Lake *Mr. W. Palgrave* has detected *β.* At Glengariff, *Wils.* Near Plymouth, *Rev. J. S. Tozer. Fr.* Sept. — Mr. Wilson has found the *D. Scottianum* with *leaves* so decidedly falcate that I have no hesitation in considering that state of the plant to be the true *D. flagellare* of *Hedw.*; but with us it is far less common than that with the leaves directed to all sides and which are usually crisped when dry. I have, however, restored the older name of Hedwig.

21. D. *undulatum,* Ehrh. (*waved-leaved Fork-Moss*); stems elongated, leaves nearly plane lanceolate attenuate serrulate at the points transversaly waved, capsule cylindraceous cernuous, lid with a long beak. *Ehrh. Crypt.* (*not of Schrad.*) *Turn. Musc. Hib. p.* 59. *Fl. Brit. p.* 1203. *E. Bot. t.* 2260. *Drum. Musc. Scot. v.* 1. *n.* 34. *Musc. Brit. ed.* 2. *p.* 100. *t.* 18.—*D. polysetum Sw.—Schwaegr. Suppl. v.* 1. *p.* 165. *t.* 41.

Woods and rocks. *Fr.* Aug. — From the large *perichætia* of this moss, 2, 3 and sometimes as many as 7 *setæ* arise. The transverse undulations of the *leaves* become much more evident when the plant is dry than in a recent state.

22. D. *scopárium,* Hedw. (*Broom Fork-Moss*); stems elongated, leaves narrow subulate canaliculate secund, capsule cylindraceous arched cernuous, lid with a long beak. *Musc. Brit.*

ed. 2. *p.* 104.—*a. vulgaris;* stems elongated robust, leaves slightly falcato-secund. *D. scoparium, Hedw. Sp. Musc. p.* 126. *Fl. Brit. p.* 1201. *Turn. Musc. Hib. p.* 58. *Hobs. Br. Mosses, v.* 1. *n.* 41. *Drum. Musc. Scot. v.* 1. *n.* 33. *Schwaegr. Suppl. v.* 1. *p.* 163. *t.* 42.—*Bryum scoparium, Linn.—E. Bot. t.* 354. *Dill. Musc. t.* 46. *f.* 16.—*β. majus;* stems more elongated, leaves more falcate and larger. *D. majus, Turn. Musc. Hib. p.* 58. *E. Bot. t.* 1490. *Schwaegr. Suppl. v.* 1. *p.* 163. *t.* 40.—*γ. fuscescens;* smaller in every part, leaves subsecund narrower somewhat crisped when dry. *D. fuscescens, Turn. Musc. Hib. p.* 60. *Fl. Brit. p.* 1204. *E. Bot. t.* 1597.—*D. congestum, Schwaegr. Suppl. v.* 1. *p.* 168. *t.* 42.—*D. longirostre, Schwaegr. Suppl. v.* 1. *p.* 170. *t.* 44.

Woods and hedges.—γ. principally in mountainous countries. *Fr.* Aug.—Most authors consider the three varieties above noticed as distinct species; but I must confess myself unable to draw any decided line of distinction; they are seen to pass gradually into each other, both in British and foreign individuals; and the species is met with in almost every quarter of the globe. The *capsule* in *α* is often cylindrical and elongated, less drooping; but at other times it is as short and as much inclined as in *β* and *γ*.

23. D. *várium*, Hedw. (*variable Fork-Moss*); stems short, leaves narrow hastato-lanceolate, capsule ovate, lid rostrate. *Musc. Brit. ed.* 2. *p.* 102. *t.* 17.—*a. viride;* leaves generally pointing in all directions lanceolate green, capsules subcernuous. *D. varium, Hedw. St. Cr. v.* 2. *t.* 34. *Turn. Musc. Hib. p.* 65. *Fl. Brit. p.* 1209. *E. Bot. t.* 1215. *Hobs. Br. Mosses, v.* 1. *n.* 42. *Drum. Musc. Scot. v.* 1. *n.* 39. *Schwaegr. Suppl. v.* 1. *p.* 174.—*D. rigidulum, Sw. Musc. Suec. t.* 3. *f.* 7. *Hedw. Sp. Musc. t.* 32. *Schwaegr. Suppl. v.* 1. *p.* 174. *Fl. Brit. p.* 1211. —*D. callistomum, Fl. Brit. p.* 1211.—*Bryum callist. Dicks.*—*β. rufescens;* leaves subsecund lanceolato-subulate reddish, capsules erect. *D. rufescens, Turn. Musc. Hib. p.* 66. *E. Bot. t.* 1216.—*Bryum rufescens, Dicks.—Dill. Musc. t.* 50. *f.* 59.—*γ. luridum;* leaves subsecund subulate of a lurid colour, capsules subcernuous. *Musc. Brit. ed.* 2. *p.* 102.

Moist banks. *Fr.* Winter.—In the rufescent *variety* the *leaves* are more pellucid and more reticulated than in *α.*:—but the *var. γ.* partakes of the character of the two others.

24. D. *heteromállum*, Hedw. (*silk-leaved Fork-Moss*); stems branched, leaves subulate falcato-secund nearly entire, capsule ovate subcernuous, lid with a long beak. *Hedw. St. Cr. v.* 1. *t.* 26. *Turn. Musc. Hib. p.* 61. *Fl. Brit. p.* 1204. *E. Bot. t.* 1272. *Hobs. Br. Mosses, v.* 1. *n.* 43. *Drum. Musc. Scot. v.* 1. *n.* 40. *Schwaegr. Suppl. v.* 1. *p.* 173. *Musc. Brit. ed.* 2. *p.* 103. *t.* 18.—(*D. orthocarpum, D. curvatum and D. interruptum of Hedw. Sp. Musc. can scarcely be distinguished from this*). —*Dill. Musc. t.* 47. *f.* 37. *and* 38.

Shaded, especially sandy banks, frequent. *Fr.* Oct. Nov.—*Leaves* deep and bright green. *Setæ* and *capsules* red-brown.

25. D. *subulátum*, Hedw. (*awl-leaved Fork-Moss*); stems branched, leaves from a broad sheathing base subulato-setaceous secund entire, capsule ovate subcernuous, lid with a long beak. *Hedw. Sp. Musc. t.* 34. *Turn. Musc. Hib. p.* 63. *Fl. Brit. p.* 1206. *E. Bot. t.* 1273. *Schwaegr. Suppl. v.* 1. *p.* 173. *Drum. Musc. Scot. v.* 2. *n.* 39. *Musc. Brit. ed.* 2. *p.* 103. *t.* 18.

Moist banks. *Mr. Drummond* finds it not unfrequently upon the Highland mountains. *Fr.* Autumn. — Closely resembling the preceding; but having a remarkably broad and sheathing base to the *leaves*.

26. D. *fulvéllum*, Sm. (*tawny Fork-Moss*); stems rather short thickly tufted simple, leaves subulato-setaceous scarcely secund those of the perichætium convolute, seta hardly longer than the leaves, capsule erect turbinate furrowed when old, lid conico-rostrate. *Fl. Brit. p.* 1209. *E. Bot. t.* 2268. *Grev. Scot. Cr. Fl. p.* 188. (*excellent*). *Musc. Brit. ed.* 2. *p.* 103. *Suppl. t.* 3. — *Bryum fulvellum, Dicks. Cr. Fasc.* 4. *t.* 11. *f.* 1.

Highlands of Scotland. Ben More, *Dicks.* Ben Nevis, *Mr. Borrer, Rev. C. Smith.* Ben Lawers, *Grev.* and *Hooker.* Clova mountains, not unfrequent, *Drummond.* Summit of Snowdon, *Dr. Taylor. Fr.* Autumn. — This is a very distinct species, with much of the habit of *Weissia acuta*. The *peristome* is bright red, the *teeth* bifid or cut into segments of various lengths, and sometimes perforated with clefts.

20. Tórtula. *Hedw.* Screw-moss.

Seta terminal. *Peristome* single, of 32 spirally twisted *teeth*, united more or less at the base into a tubular membrane. *Calyptra* dimidiate. (*Musc. Brit. t.* 2.) Named from *tortus, twisted*, in allusion to the nature of the peristome.

* *Leaves thick and rigid.*

1. T. *enérvis*, Hook. and Greville (*nerveless rigid Screw-Moss*); stems very short, leaves few lingulate very obtuse concave nerveless rigid the margins involute, lid conico-acuminate rather shorter than the oblong capsule. *Hook. et Greville in Brewst. Journ. v.* 1. *p.* 288. *Musc. Brit. ed.* 2. *p.* 52. *Suppl. t.* 2. — *T. rigida, Fl. Brit. p.* 1249. *E. Bot. t.* 180. *Schwaegr. Suppl. v.* 1. *p.* 118. — *Barbula rigida, Hedw. St. Cr. v.* 1. *p.* 65. *t.* 25.

Walls and clay banks, near Yarmouth. Stiblington, Kent, *Rev. J. M. Berkeley. Fr.* Dec.

2. T. *breviróstris*, Hook. and Greville, (*short-beaked rigid Screw-Moss*); stems very short, leaves few rotundato-elliptical very obtuse concave nerveless rigid the margins involute, lid conical scarcely beaked half the length of the oblong capsule. *Hook. et Grev. in Brewst. Journ. v.* 1. *p.* 289. *t.* 2. *Musc. Brit. ed.* 2. *p.* 53. *Suppl. t.* 2. *Grev. Scot. Cr. Fl. v.* 6. *t.* 331. — *T. rigida, Funck, Deutschl. Moose, t.* 15.

On an old wall near Edinburgh, *D. Stewart, Esq. Fr.* Winter.

3. T. *rígida*, Turn. (*Aloe-like rigid Screw-Moss*); stem very short, leaves few linear incurved submucronulate grooved nerved

rigid the margins involute, lid rostrate about half the length of the oblong capsule. *Turn. Musc. Hib. p.* 43. *Hobs. Br. Mosses, v.* 1. *n.* 21. *Musc. Brit. ed.* 2. *p.* 53. *f.* 12. *Grev. Scot. Cr. Fl. v.* 6. *t.* 348.—*Bryum rigidum, Huds.*—*Dill. Musc. p.* 49. *f.* 55.

On clay-banks, in the South-East of England. Wall-top, near Dublin, *Drummond. Fr.* Nov.—The *peristome* of this moss is shorter and less twisted than that of most other *Tortulæ;* hence Mougeot and Nestler have published it as a *Trichostomum,* and under the appropriate specific name of *T. aloides.*

** *Leaves more or less membranous.*

† *Perichætial leaves convolute, sheathing.*

4. T. *convolúta,* Sw. (*convolute Screw-Moss*); stems rather short, leaves oblongo-lanceolate acute their margins plane those of the perichætium remarkably involute, capsule oblong, lid rostrate. *Sw. Musc. Suec. Fl. Brit. p.* 1253. *E. Bot. t.* 2382. *Turn. Musc. Hib. p.* 149. *Hobs. Br. Mosses, v.* 2. *n.* 19. *Drum. Musc. Scot. v.* 1. *n.* 23. *Musc. Brit. ed.* 2. *p.* 54. *f.* 12.—*Barbula convoluta, Hedw. St. Cr. v.* 1. *p.* 87. *t.* 32. *Schwaegr. Suppl. v.* 1. *p.* 127.—*Bryum convolutum, Dicks.*—*Dill. Musc. t.* 48. *f.* 44.

Banks and upon turf-walls; not uncommon in the north. *Fr.* Spring.—The *setæ* are pale-coloured, like those of *Didymodon pallidus;* the whole foliage is of a yellowish hue, and the *perichætial leaves* are strikingly convolute.

5. T. *revolúta,* Brid. (*revolute Screw-Moss*); stems short, leaves lanceolate acute their margins remarkably revolute those of the perichætium sheathing involute, capsule oblong, lid rostrate shorter than the capsule. *Brid. in Schrad. Journ.* 1800. *Drum. Musc. Scot. v.* 2. *n.* 22. *Musc. Brit. ed.* 2. *p.* 54. *t.* 12.—*T. nervosa, E. Bot. t.* 2383.—*Barbula revoluta, Mohr.*—*Schwaegr. Suppl. v.* 1. *p.* 127. *t.* 32.—β. *obtusifolia, Schwaegr. Suppl. v.* 1. *t.* 31.

Banks and sandy places. *Fr.* Spring.

†† *Leaves uniform.*

6. T. *murális,* Hedw. (*wall Screw-Moss*); stems mostly short, leaves patent narrow oblong the margins recurved, the nerve strong running out into a hair-like point, capsule oblongo-cylindrical, lid conical acuminate.—α. *vulgaris;* leaves carinated tipped with a long white hair-like point. *T. muralis, Hedw. Sp. Musc. p.* 123. *Turn. Musc. Hib. p.* 50. *Fl. Brit. p.* 1257. *E. Bot. t.* 2033. *Hobs. Br. Mosses, v.* 2. *n.* 16. *Drum. Musc. Scot. v.* 2. *n.* 24. *Musc. Brit. ed.* 2. *p.* 55. *t.* 12.—*Barbula muralis, Mohr.*—*Schwaegr. Suppl. v.* 1. *p.* 132.—*Bryum murale, Linn.*—*Dill. Musc. t.* 45. *f.* 14.—β. *brevipila;* leaves nearly plane scarcely piliferous. *Musc. Brit. ed.* 2. *p.* 55.—*Barbula æstiva, Web. et Mohr, Cr. Germ. p.* 207.—β. *cuneifolia, Funck, Deutschl. Moose, t.* 15. *f.* 12.

On walls and stones, very frequent. *Fr.* April.—An *annulus* is present at the mouth of the *capsule* of this species.

7. T. *rurális*, Sw. (*great hairy Screw-Moss*); stems elongated, leaves ovato-oblong keeled patent recurved, the nerve ending in a long point, capsule cylindrical erect slightly curved, lid subulate, lower half of the peristome tubular as far as the middle.—*α. vulgaris;* leaves rather acute, the hair-like points generally scabrous. *T. ruralis, Sw. Musc. Suec.—Turn. Musc. Hib. p.* 50. *Fl. Brit. p.* 1254. *E. Bot. t.* 2070. *Schwaegr. Suppl. v.* 1. *p.* 137. *t.* 34. *Hobs. Br. Mosses, v.* 1. *n.* 22. *Drum. Musc. Scot. v.* 2. *n.* 18. *Musc. Brit. ed.* 2. *p.* 56.—*Syntrichia ruralis, Brid.—Barbula ruralis, Hedw. Sp. Musc. p.* 121.—*Bryum rurale, Linn.—Dill. Musc. t.* 45. *f.* 12.—*β. lævipila;* leaves more obtuse contracted in the middle, hair-like point generally smooth. *Syntrichia lævipila, Brid.—Schwaegr. Suppl.* 2. *P.* 1. *p.* 66. *t.* 120.

Roofs of houses, especially such as are thatched with straw; on walls and on the ground, rarely on trees. *β.* On clay-slate, near Truro, *Rev. J. S. Tozer. Fr.* April.—*Mr. Lyell* finds in Hampshire and *Mr. Wilson* at Finlarig, Perthshire, a *variety* growing on trees (especially the Sycamore), in which the *nerves* are gemmiferous, the *gemmæ* clothing the upper-side of the nerve, near the middle of the *leaf*, of a roundish or oblong form, green, reticulated; the nerve, however, is by no means so dilated as that of the gemmiferous *Gymnostomum ovatum.*

8. T. *subuláta*, Hedw. (*awl-shaped Screw-Moss*); stems very short, leaves erecto-patent oblongo-lanceolate apiculated the margin plane, capsule cylindrical erect slightly curved, lid subulate, peristome tubular almost to the extremity.—*α.* leaves acuminated. *T. subulata, Hedw. Sp. Musc. p.* 122. *t.* 27. *Turn. Musc. Hib. p.* 44. *Fl. Brit. p.* 1255. *E. Bot. t.* 1101. *Schwaegr. Suppl. v.* 1. *p.* 135. *t.* 38. *Hobs. Br. Mosses, v.* 1. *n.* 23. *Drum. Musc. Scot. v.* 2. *n.* 21. *Musc. Brit. ed.* 2. *p.* 57. *t.* 12.—*Barbula subul. Moug. et Nestl. n.* 126.—*Syntrichia subul. Mohr.—Bryum subulatum, Linn.—Dill. Musc. t.* 45. *f.* 10.—*β.* leaves oblong obtuse with a mucro.

Banks and shady places, abundant. *β.* New Forest, Hants, *C. Lyell, Esq. Fr.* Dec.—The *leaves* are somewhat succulent, pellucid and reticulated in their lower half, curled when dry. The *peristome* is a bright red twisted tube, the *teeth*, or *cilia*, free only at the end, where they form a twisted tuft.

9. T. *unguiculáta*, Hook. and Taylor, (*Bird's-claw Screw-Moss*); stems elongated branched, leaves oblongo-lanceolate subcarinated obtuse apiculated their margins slightly recurved, capsule oblongo-ovate, lid long rostrate. *Musc. Brit. ed.* 2. *p.* 58. *t.* 12. *Hobs. Br. Mosses, v.* 1. *n.* 24. *Drum. Musc. Scot. v.* 2. *n.* 25.—*Barbula unguiculata, Hedw. St. Cr. v.* 1. *t.* 23. *Schwaegr. Suppl. v.* 1. *p.* 123. *Dill. Musc. t.* 48. *f.* 48. 49.—*Barbula acuminata, Hedw. Sp. Musc. p.* 117. *t.* 26. *Schwaegr. Suppl. v.* 1. *p.* 123.—*Tort. acum. Sw.—Turn. Musc. Hib. p.* 47. *Fl. Brit. p.* 1250. *E. Bot. t.* 1299.—*T. aristata, Fl. Brit.*

p. 1261. *E. Bot. t.* 2393.— *T. barbata, Fl. Brit. p.* 1260. *E. Bot. t.* 2391.— *T. humilis, Turn.*—*E. Bot. t.* 1663.—*Barbula apiculata, Hedw. Sp. Musc. p.* 117. *t.* 26. *Schwaegr. Suppl. v.* 1. *p.* 122.—*Tort. ericetorum, Fl. Brit. p.* 1258. *E. Bot. t.* 2495.—*Barbula lanceolata, Hedw. Sp. Musc. p.* 119. *t.* 26.—*B. stricta, Hedw. Sp. Musc. p.* 119. *t.* 26. *Schwaegr. Suppl. v.* 1. *p.* 122.

Banks and hedges, very frequent. *Fr.* Winter.—A variable plant assuredly, and growing in almost every soil and situation.

10. T. *stellàta*, Sm. (*stellated Screw-Moss*); stems very short tufted, leaves oblongo-ovate or ovate rather concave subopaque mucronulate furnished with a strong brown nerve. *Fl. Brit. p.* 1254. *E. Bot. t.* 2384. *Musc. Brit. ed.* 2. *p.* 58. *t.* 12.—*Bryum stellatum. Dicks. Cr. Fasc.* 2. *t.* 6. (excluding the synonyms.)—*Barbula agraria, Hedw. Sp. Cr. v.* 3. *t.* 6. *Schwaegr. Suppl. v.* 1. *p.* 129.

At the borders of fields and the margin of rivulets, Scotland, *Dickson. Fr.* ——? As it has been ascertained that Mr. Dickson's plant is the same as a well-known one from the West Indies, is it not possible that he may have taken a specimen from that country for one gathered in Scotland?

11. T. *cuneifólia*, Turn. (*wedge-shaped Screw-Moss*); stems scarcely any, leaves very broad obovate slightly concave pellucid the nerve running out into rather a strong mucro, capsule oblong, lid with a short beak, cilia of the peristome united at the very base. *Turn. Musc. Hib. p.* 51. *Fl. Brit. p.* 1257. *E. Bot. t.* 1510. *Musc. Brit. ed.* 2. *p.* 59. *t.* 12.—*Bryum cuneifolium, Dicks. Cr. Fasc.* 3.

Banks and sandy fields; particularly common near Torquay and about Tor-point, Devonshire. Frequent also in Cornwall, *Rev. J. S. Tozer.* Cove of Cork, *Wilson. Fr.* Feb.

12. T. *tortuósa*, Hedw. (*frizzled Mountain Screw-Moss*); stems elongated branched, leaves patent linear-subulate keeled waved, crisped when dry, capsule cylindrical, lid with a long beak. *Hedw. Sp. Musc. p.* 124. *Turn. Musc. Hib. p.* 58. *Hobs. Brit. Mosses, v.* 2. *n.* 17. *Drum. Musc. Scot. v.* 2. *n.* 19. *Musc. Brit. ed.* 2. *p.* 59. *t.* 12.—*Barbula tortuosa, Schwaegr. Suppl. p.* 129. *t.* 33.—*Bryum tortuosum, Linn.*—*Dill. Musc. t.* 48. *f.* 40.

Rocks, especially in limestone districts. *Fr.* July.—Nearly allied to this, is the *Barbula inclinata*, Schwaegr.; but its *stems* and *leaves* are short, the latter more erect and the *capsule* is more curved.

13. T. *fállax*, Sw. (*fallacious Screw-Moss*); stems elongated branched, leaves lanceolate acuminate keeled patent or recurved the margins reflexed, capsule oblong, lid with a long beak. *Musc. Brit. p.* 60. *t.* 12.—*a.* stems about an inch high, leaves recurved. *T. fallax, Swartz, Musc. Suec. p.* 40. *Turn. Musc. Hib. p.* 48. *Fl. Brit. p.* 1252. *E. Bot. t.* 1708. *Hobs. Brit. Mosses, v.* 2. *n.* 18. *Drum. Musc. Scot. v.* 2. *n.* 20.—*Barbula fallax, Hedw. St. Cr. v.* 1. *p.* 24. *Schwaegr. Suppl. v.* 1. *p.* 127.

— *Tortula imberbis, Fl. Brit. p.* 1261. *E. Bot. t.* 2329.— *T. unguiculata, Turn. Musc. Hib. p.* 47. *Fl. Brit. p.* 1251. *E. Bot. t.* 2316. (*not Hedw.*)— *Dill. Musc. t.* 48. *f.* 46, 47.— β. stem two or three inches high, leaves longer and patent. *Bryum linoides, Dicks. Cr. Fasc.* 3. *t.* 8. *f.* 3.— *Barbula linoides, Brid.* (not *Tortula linoides, E. Bot.*).— γ. stem half an inch high, fruitstalks elongated. *Barbula brevicaulis, Schwaegr. Suppl. v.* 1. *p.* 126. *t.* 32.

Walls, banks and in fields among grass. *Fr.* June, July.— This is indeed a highly variable plant; the dwarf specimens growing in dry fields can scarcely be recognized as the same with the luxuriant ones inhabiting the moist banks of rivers. The *leaves* are usually considerably recurved when moist; in the *var.* β., they are longer and sharper than in the other states of the plant.

14. T. *grácilis*, Hooker and Grev. (*slender Screw-Moss*); stems elongated somewhat branched, leaves lanceolato-acuminate erect rigid when dry very straight the margin recurved, capsule oblongo-ovate, lid rostrate very short. *Hooker and Grev. in Brewst. Journ. v.* 1. *p.* 300. *Musc. Brit. ed.* 2. *p.* 64. *t.* 61. *Suppl. t.* 2.— *Barbula gracilis, Schwaegr. Suppl. p.* 125. *t.* 34. — β. *viridis;* stems stouter and leaves somewhat wider, the latter a little patent green. *T. brevifolia, Fl. Brit. p.* 1259. *E. Bot. t.* 2553.

Scotland, *Dicks., Drummond.* β. Durham and Northumberland, *Mr. Winch.* Near Cork, *Mr. James Drummond. Fr.* ——? Nearly allied to *T. fallax*, but a slenderer plant, with *leaves* that are far more rigid, more erect, and very straight, when dry appressed to the stem. Colour brownish-green. Perhaps the *var.* β. might with more propriety be referred to the preceding species.

21. Cinclidótus. *Beauv.* Lattice-Moss.

Seta (very short) terminal. *Peristome* single, of 32 filiform at length twisted *teeth*, anastomosing at the base. *Calyptra* mitriform. (*Musc. Brit. t.* 1.)— Name, κιγλιδωτος, *latticed:* from the anastomosing teeth or cilia.— Mr. Wilson has observed that at the moment when the lid is removed, the teeth of the peristome are scarcely inclined, certainly not twisted; although they afterwards become so.

1. C. *fontinaloídes*, Beauv. (*Fountain Lattice-Moss*).—*Beauv. Prodr. p.* 28. *and* 32. *Hobs. Brit. Mosses, v.* 2. *n.* 15. *Drum. Musc. Scot. v.* 1. *n.* 50. *Musc. Brit. ed.* 2. *p.* 51. *t.* 11.— *Trichostomum fontinaloides, Hedw. St. Cr. v.* 3. *p.* 36. *t.* 14. *Turn. Musc. Hib. p.* 41. *Schwaegr. Suppl. v.* 1. *p.* 160. *Fl. Brit. p.* 1248.— *Fontinalis minor, Linn.*— *E. Bot. t.* 557.— *F. alpina, Dicks. Cr. Fasc.* 2. *p.* 4. *f.* 1. *Racomitrion, Brid.*— *Dill. Musc. t.* 33. *f.* 2.

On stones and wood, in streams of water. *Fr.* Apr.— *Plant* from 4 —6 inches long, branched, dark lurid green, with the habit of a *Tri-*

chostomum. *Leaves* elliptic-lanceolate, acuminated, margined, entire, waved, crisped when dry; *nerve* strong. *Perichætial leaves* nearly as long as the fruit, much acuminated. *Capsules* nearly *sessile*, often on very short branches, but terminal, oblong, smooth. *Lid* conico-acuminate. *Calyptra* sometimes split on one side. *Peristome* red, *teeth* or *cilia* very slender, rigid.

22. Polýtrichum. *Linn.* Hair-Moss.

Seta terminal. *Peristome* single, of 32 or 64 short equidistant incurved *teeth;* their summits united to a horizontal membrane, closing the mouth of the capsule. *Calyptra* dimidiate, small. (*Musc. Brit. t.* 1.)—Named from πολυς, *many*, and θριξ, a *hair*, in allusion to the *calyptra* being generally invested with a dense mass of hairs, which are indeed the "*fila succulenta*" of the flower, carried up by the calyptra.—A very natural Genus. *Leaves* mostly rigid, resembling those of an *Aloe* in miniature: the nerves more or less distinctly lamellated or striated.

* *Calyptra naked.* (Catharinea, *Ehrh.*)

1. P. *undulátum*, Hedw. (*undulated Hair-Moss*); leaves membranous lanceolate waved the margins plane toothed denticulate the nerve winged, capsule cylindrical curved, lid subulate. *Hedw. St. Cr. v.* 1. *p.* 16, 17. *Turn. Musc. Hib. p.* 91. *Fl. Brit. p.* 1382. *E. Bot. t.* 1220. *Schwaegr. Suppl. v.* 1. *p.* 330. *Hobs. Brit. Mosses, v.* 1. *n.* 13. *Drum. Musc. Scot. v.* 2. *n.* 20. *Musc. Brit. ed.* 2. *p.* 43. *t.* 10.—*Bryum undulatum, Linn.—Dill. Musc. t.* 46. *f.* 18.

Moist shady banks and in woods, frequent. *Fr.* Oct.

2. P. *hercýnicum*, Hedw. (*Hercynian Hair-Moss*); leaves lanceolate rigid entire their sides involute, their nerve broad impressed with furrows, capsule oblong suberect, lid conical. *Hedw. St. Cr. v.* 1. *p.* 15. *Fl. Brit. p.* 1381. *E. Bot. t.* 1209. *Schwaegr. Suppl. v.* 1. *p.* 329. *Musc. Brit. ed.* 2. *p.* 44. *t.* 10.

On elevated mountains, abundant. *Fr.* July.—The *leaves* are, as it were, intermediate in texture between the preceding and following species.

** *Calyptra covered with succulent filaments.*

† *Leaves entire, their margins involute.*

3. P. *piliferum*, Schreb. (*bristle-pointed Hair-Moss*); leaves lanceolato-subulate their margins involute entire terminating in a pellucid hair-like point, capsule ovate obtusely quadrangular furnished with an apophysis, lid conical. *Schreb. Fl. Lips. p.* 74. *Turn. Musc. Hib. p.* 82. *Fl. Brit. p.* 1375. *E. Bot. t.* 1199. *Schwaegr. Suppl. v.* 1. *p.* 313. *Hobs. Br. Mosses, v.* 1. *n.* 14. *Drum. Musc. Scot. v.* 2. *n.* 17. *Musc. Brit. ed.* 2. *p.* 44. *t.* 10.—*P. commune*, γ. *Linn.—Dill. Musc. t.* 54. *f.* 3.

Heathy places, frequent. *Fr.* Spring.—*Stems* short, bare of *leaves* at the base.

4. P. *juniperínum*, Willd. (*Juniper-leaved Hair-Moss*); leaves lanceolato-subulate their margins involute entire their points acuminate coloured subserrated, capsule ovate obtusely quadrangular, furnished with an apophysis. *Willd. Fl. Berol.*—*Hedw. Sp. Musc. t.* 18. *Turn. Musc. Hib. p.* 82. *Fl. Brit. p.* 1375. *E. Bot. t.* 1200. *Hobs. Br. Mosses, v.* 1. *n.* 15. *Drum. Musc. Scot. v.* 1. *n.* 17. *Schwaegr. Suppl. v.* 1. *p.* 309. *Musc. Brit. ed.* 2. *p.* 45. *t.* 10.—*β.* gracilius; P. *strictum, Menz. in Linn. Trans. v.* 4. *t.* 7. *f.* 2. *Turn. Musc. Hib. p.* 83. *E. Bot. t.* 2435.—*P. alpestre, Hoppe.*—*Schwaegr. Suppl. v.* 1. *p.* 310. *t.* 97.—*P. affine, Funck, Deutschl. Moose, t.* 54. *B. n.* 3.—*P. commune, β. Linn.*—*Dill. Musc. t.* 54. *f.* 3.

On heaths and on wall-tops that are covered with earth. *β.* on mountains. *Fr.* Spring.—The *P. strictum* of the excellent *Menzies* is indeed a more elongated and slenderer plant than the usual state of *P. juniperum;* but the *P. alpestre* of Hoppe and Schwaegrichen is exactly a connecting link.—It will be seen by the essential character how closely this species is allied to the preceding.

5. P. *septentrionále*, Sw. (*northern Hair-Moss*); leaves linear-subulate obtuse their margins especially towards the top involute subserrulate, capsule ovate subangulate, apophysis obsolete, lid conical acuminate. *Sw. Musc. Suec. t.* 9. *f.* 18. *Schwaegr. Suppl. v.* 1. *p.* 313. *Hobs. Br. Mosses, v.* 2. *n.* 14. *Musc. Brit. ed.* 2. *p.* 46.—*P. sexangulare, Hoppe.*—*E. Bot. t.* 1906.

Summits of the highest Scottish Alps. *Fr.* Aug.—Its *fructification* is exceedingly rare and only found on the Cairngorum mountains; *Greville, Arnott, Hooker.* Plentiful there in 1830, which had been a very wet season (*Greville*).—The *leaves* are very obtuse and much incurved, semicylindrical. *Setæ* very thick and succulent. *Capsule* scarcely angular. It is a very alpine and a very arctic moss.

†† *Leaves serrated, their margins plane.*

6. P. *commúne*, L. (*common Hair-Moss*); stems elongated, leaves patent linear-subulate their margins plane serrated as well as the points of the keels, capsule oblongo-quadrangular with an evident apophysis. *Musc. Brit. ed.* 2. *p.* 47. *t.* 10.—*α. yuccæfolium;* stems a span or more high, leaves with their margins of the same colour, capsule acutely quadrangular, apophysis very distinct. *Linn.*—*Hedw. Sp. Musc. p.* 88. *Fl. Brit. p.* 1372. *E. Bot. t.* 1197. *Schwaegr. Suppl. v.* 1. *p.* 314. *Hobs. Br. Mosses, v.* 1. *n.* 16. *Drum. Musc. Scot. v.* 2. *n.* 16.—*P. remotifolium, Schwaegr. Suppl. v.* 1. *p.* 320.—*P. yuccæfolium, Ehrh.*—*Dill. Musc. t.* 54. *f.* 1.—*β. attenuatum;* stems 3—4 inches high, leaves shorter their margins pellucid, capsule obtusely quadrangular, apophysis indistinct. *P. attenuatum, Menz. in Linn. Trans. v.* 4. *t.* 6. *f.* 2. *Turn. Musc. Hib. p.* 84. *Fl. Brit. p.* 1373. *E. Bot. t.* 1198.—*P. formosum, Hedw. Sp. Musc. t.* 19. *f.* 1. *Schwaegr. Suppl. v.* 1. *p.* 315.—*P. gracile, Menz. in Linn. Trans. v.* 4. *t.* 6. *f.* 3. *Turn. Musc. Hib. p.* 85. *E. Bot. t.* 1827.—*P. longisetum, Sw. Musc. Suec. t.* 8. *f.* 6.—*P. aur-*

antiacum, *Hoppe*, and *P. pallidisetum*, *Funck*, *Deutschl. Moose*, *t.* 56. *f.* 10.

Heaths and woods in sandy soils, both in wet and dry situations. *Fr.* June.—The *stems*, in all the states of this plant, (and they are very numerous, though I have considered only two worthy of particular notice,) are simple or only branched very low down, and among the roots. *Var. α.* is found from a span to a foot in height, with the *leaves* very patent, often recurved, long and narrow, their margins scarcely diaphanous. In *β.* the *stems* do not often exceed 3–4 inches; the *leaves* are rather less patent than in *α.*, and of a shorter and broader figure, with their margins whitish and diaphanous. In both the *leaves* are equally decidedly serrated.

7. P. *alpínum*, Linn. (*alpine Hair-Moss*); stems elongated branched in a fasciculated manner, leaves patent subulato-lanceolate their margins plane serrated as well as the points of the keels, capsule oblique subovate with a distinct apophysis. *Linn. Sp. Pl. p.* 1593. *Hedw. Sp. Musc. t.* 19. *Turn. Musc. Hib. p.* 85. *Fl. Brit. p.* 1377. *E. Bot. t.* 1905. *Schwaegr. Suppl. v.* 1. *p.* 317. *Hobs. Br. Mosses, v.* 1. *n.* 17. *Drum. Musc. Scot. v.* 1. *n.* 16. *Musc. Brit. ed.* 2. *p.* 48. *t.* 11.—*P. sylvaticum*, *Menz. in Linn. Trans. v.* 4. *t.* 7. *f.* 6.—*P. arcticum*, *Sw. Musc. Suec. t.* 8. *f.* 17.

Frequent upon the earth, in alpine situations; rare in the low ground, as at Llyn Ogwen, by the Shrewsbury road, N. Wales. *Wils. Fr.* July.

8. P. *urnígerum*; stems elongated branched, leaves erecto-patent lanceolate acute their margins plane serrated, capsule erect cylindrical destitute of an apophysis. *Linn. Sp. Pl. p.* 1573. *Hedw. Sp. Musc. p.* 100. *t.* 22. *f.* 5—7. *Turn. Musc. Hib. p.* 86. *Fl. Brit. p.* 1377. *E. Bot. t.* 1218. *Schwaegr. Suppl. v.* 1. *p.* 318. *Hobs. Br. Mosses, v.* 1. *n.* 18. *Drum. Musc. Scot. v.* 1. *n.* 15. *Musc. Brit. ed.* 2. *p.* 49.

Sandy places, on banks and by the sides of streams, especially in mountainous countries. Rare in the plains, yet abundant on banks at Gillingham, Norfolk; *D. Turner, Esq. Fr.* Nov.—*Leaves* singularly glaucous (reddish only through age).

9. P. *aloídes*, Hedw. (*dwarf long-headed Hair-Moss*); stems usually short, leaves linear-lanceolate obtuse their margins plane serrated principally at the extremity and at the summit of the keels, capsule nearly erect cylindrical, apophysis none. *Hedw. St. Cr. v.* 1. *t.* 14. *Turn. Musc. Hib. p.* 88. *Fl. Brit. p.* 1380. *E. Bot. t.* 1619. *Schwaegr. Suppl. v.* 1. *p.* 322. *Hobs. Br. Mosses, v.* 1. *n.* 18. *Drum. Musc. Scot. v.* 2. *n.* 19. *Musc. Brit. ed.* 2. *p.* 49. *t.* 11.—*P. rubellum*, *Menz. in Linn. Trans. v.* 1. *t.* 7. *f.* 3. *Turn. Musc. Hib. p.* 87. *Fl. Brit. p.* 1381. *E. Bot. t.* 1389.—*Mnium polytrichoides*, *β. Linn. Sp. Pl. p.* 1577.—*Dill. Musc. t.* 55. *f.* 7.—*β. Dicksoni*; seta very short, stems branched with innovations. *P. Dicksoni*, *Turn. Musc. Hib. p.* 90. *t.* 10. *f.* 2. *E. Bot. t.* 1605.

Sandy moist banks and in shady woods, common. *Fr.* Dec.—The *P. rubellum* of Mr. Menzies has the *stems* elongated, sometimes half an

inch in length. The *var.* β. has the *stems* branched with innovations, each bearing a very short *seta*, which gives the plant a remarkable appearance.

10. P. *nánum*, Hedw. (*dwarf round-headed Hair-Moss*); stems short, leaves linear-lanceolate obtuse their margins and the summit of the keel serrated principally at the extremity, capsule nearly erect subglobose. *Hedw. St. Cr. v.* 1. *t.* 13. *Turn. Musc. Hib. p.* 89. *Fl. Brit. p.* 1379. *E. Bot. t.* 1625. *Schwaegr. Suppl. v.* 1. *p.* 324. *Hobs. Br. Mosses, v.* 1. *n.* 20. *Drum. Musc. Scot. v.* 2. *n.* 20. *Musc. Brit. ed.* 2. *p.* 50. *t.* 11. — *P. subrotundum, Menz.* — *Fl. Brit. p.* 1378. *E. Bot. t.* 1624. — *P. pumilum, Sw. Musc. Suec. t.* 9. *f.* 19. *Hedw. Sp. Musc. t.* 21. — *Dill. Musc. t.* 55. *f.* 6.

Moist sandy banks, frequently with *P. aloides*. *Fr.* Dec. — It will be seen that this differs in no particular from the preceding but in its rounded *capsule*.

(*See* Entosthodon *and some* Orthotricha *in* Diploperistomi.)

Div. II. *Peristome double.* Diploperistomi.[1]

A. *Internal peristome composed of distinct teeth or cilia,* (*in* Entosthodon *obsolete.*)

23. Entósthodon. *Schwaegr.* Entosthodon.

Seta terminal. *Peristome* double? the *outer* of 16 remote *teeth*, arising from within the mouth of the capsule horizontal and slightly oblique; the *inner* obsolete or wanting. *Capsule* pyriform, with an *apophysis*. *Calyptra* dimidiate, inflated below.— Named from εντοσθον, *within*, and οδων, a *tooth*, on account of the insertion of the peristome.

1. E. *Templetóni*, Schwaegr. (*Mr. Templeton's Entosthodon*). *Schwaegr. Suppl.* 2. *p.* 44. *t.* 113. — *Funaria Templetoni, E. Bot. t.* 2524. — *Weissia Templetoni, Musc. Brit. ed.* 1. *p.* 42. *ed.* 2. *p.* 77. *t.* 14. *Hook. in Fl. Lond. cum Ic. Hobs. Br. Mosses, v.* 2. *n.* 27.

Moist banks in a tenacious soil, in many parts of Ireland, the West of Scotland and Wales, *Wilson*. Near Kilmun, Argyleshire, *Mr. G. Lyon*. *Fr.* July. — At the suggestion of my intelligent and accurate friend Mr. Wilson, who has seen, though very imperfectly, traces of a double peristome in some Welch specimens, I place this plant in the "*Diploperistomi*," and near to *Funaria*, with which it has a very great affinity, especially with the *F. Fontainesii*. The *leaves* are ovato-lanceolate, acute, entire; *capsule* narrow, pyriform (including the *apophysis*,) the *lid* nearly plane. I have never seen more than a single peristome, and that has appeared to me to arise from the membrane lining the *capsule*, whose mouth is not oblique as in *Funaria*.

24. Funária. *Schreb.* Cord-moss.

Seta terminal. *Peristome* double, oblique: the *outer* of 16 compact *teeth*; the *inner* of as many *cilia* opposite to the teeth of

[1] διπλος, *double*, and περιστομα, the *peristome*.

the outer. *Capsule* pyriform, its mouth oblique. *Calyptra* inflated below. (*Musc. Brit. t.* 2.)—Named from *funis*, a cord; because in dry weather the seta of the common species becomes twisted, and indeed constitutes an excellent hygrometer.

1. F. *hygrométrica*, Hedw. (*hygrometric Cord-Moss*); leaves very concave ovate apiculated entire, nerve excurrent, seta curved flexuose. *Hedw. Sp. Musc. p.* 172. *Turn. Musc. Hib. p.* 105. *Hobs. Br. Mosses, v.* 1. *n.* 52. *Drum. Musc. Scot. v.* 1. *n.* 54. *Schwaegr. Suppl. v.* 1. *P. II. p.* 75. *Musc. Brit. ed.* 2. *p.* 121. *t.* 20.—*Mnium hygrometricum, Linn. Sp. Pl. p.* 1575. —*Bryum hygrom., E. Bot. t.* 342.

Old walls and buildings, heaths, moors, and in woods, particularly where any thing has been burnt. Hence it is called *La Charbonnière* in France. *Fr.* May.—Mr. Wilson observes that a red corrugated border to the mouth of the *capsule* is constant and peculiar to this species.

2. F. *Muhlenbergii*, Turn. (*Dr. Muhlenberg's Cord-Moss*); stems short, leaves concave ovate suddenly acuminated serrated, the nerve disappearing below the point, seta straight. *Turn. in Ann. of Bot. v.* 2. *p.* 198. *E. Bot. t.* 1498. *Schwaegr. Suppl. v.* 1. *P. II. p.* 78. *t.* 66. *Musc. Brit. ed.* 2. *p.* 122. *t.* 20.

Subalpine countries, among rocks and in a limestone soil: most frequent in the south of England and Ireland. *Fr.* Apr. May.

3. F. *hibérnica*, Hook. (*Irish Cord-Moss*); stems elongated, leaves plane ovato-lanceolate gradually acuminated serrated, the nerve disappearing below the point, seta straight. *Hook. in Fl. Lond. cum Ic. Musc. Brit. ed.* 2. *p.* 122. *t.* 20.—*F. Muhlenbergii, Mohr.*—*Funck, Deutschl. Moose, t.* 27. *n.* 2.

On the roof of a thatched cottage at Blarney, near Cork, Ireland; *Mr. James Drummond. Fr.* ——?—Although this has longer *stems* and *setæ*, more distantly placed, plane and more elongated and gradually acuminated *leaves;* yet it may be only a *var.* of the preceding, depending upon the place of growth for its characters.

25. Zýgodon. *Hook. and Taylor.* Yoke-Moss.

Seta terminal. *Peristome* double: the *outer* of 16 *teeth* approaching in pairs; the *inner* of 8 or 16 *cilia* lying horizontally. *Calyptra* dimidiate, smooth. (*Musc. Brit. t.* 3.)—Name, ζυγος, a *yoke*, and οδων, a *tooth;* from the teeth being placed in pairs.

1. Z. *conoideus*, Hook. and Taylor, (*lesser Yoke-Moss*); leaves acute, cilia 8. *Musc. Brit. ed.* 1. *p.* 74. *ed.* 2. *p.* 123. *t.* 21. *Schwaegr. Suppl. v.* 2. *t.* 136. *Hobs. Br. Mosses, v.* 1. *n.* 33.—*Amphidium pulvinatum, Sturm, Deutschl. Fl.* (*with a figure*). *Funck, Deutschl. Moose, t.* 22. *n.* 1.—*Gagea compacta, Raddi.*—*Mnium conoideum, Fl. Brit. p.* 1345. *E. Bot. t.* 1239.—*Bryum conoideum, Dicks. Cr. Fasc.* 4. *t.* 11. *f.* 2. *Turn. Musc. Hib. p.* 112.—*Gymnocephalus conoides, Schwaegr. Suppl. v.* 1. *P. II. p.* 87.

On trees, rare: in the West of Scotland, particularly at Inverary,

where it was discovered by *Mr. Dickson.* Orange Grove, near Belfast, *Mr. Templeton.* Frequent in Ireland on the Hasel, and sometïmes on the Ash : also in Anglesea, *Wilson.* Near Manchester, *Mr Hobson. Fr.* Jan. — This plant grows in small lax tufts : the *stems* nearly half an inch high. *Leaves* erecto-patent, between ovate and lanceolate, plane or slightly keeled, entire, dotted as in *Gymnostomum viridissimum*, the *nerve* reaching to the point. *Capsule* narrow, obovate, striated. *Lid* rostrate. — The Rev. Colin Smith showed me this plant in great abundance upon trees at Inverary, growing with *Gymnostomum viridissimum.*

26. ORTHÓTRICHUM. *Hedw.* Bristle-Moss.

Seta terminal. *Peristome* mostly double : the *outer* of 16 *teeth* approaching in pairs ; the *inner* of as many *cilia* lying horizontally (sometimes wanting). *Calyptra* mitriform, sulcate, more or less hairy. (*Musc. Brit. t.* 2.) — Name, ορθος, *straight*, and θριξ, a *hair ;* from the circumstance of the calyptra being generally clothed with hairs.—This is a very peculiar and natural genus, yet very difficult to be defined by words, on account of the varied nature of the peristome : and, in almost all, the leaves are so similar, that except by the fruit the species are scarcely distinguishable.

* *Peristome single.*

† *Capsule immersed.*

1. O. *cupulátum*, Hoffm. (*single-fringed sessile-fruited Bristle-Moss*) ; leaves ovato-lanceolate erecto-patent, when dry erect straight rigid, capsule nearly sessile furrowed for its whole length, calyptra somewhat hairy at length quite glabrous. *Hoffm. Germ. v.* 2. *p.* 26. *Schwaegr. Suppl. v.* 1. *P. II. p.* 35. *t.* 55. *Drum. Musc. Scot. v.* 2. *n.* 51. *Musc. Brit. ed.* 2. *p.* 125. *t.* 21. — *O. anomalum, Fl. Brit. p.* 1267. *E. Bot. t.* 1423. — *O. nudum, Fl. Brit. p.* 1268. *E. Bot. t.* 1325. — *O. strangulatum, Beauv.* — *Schwaegr. Suppl. v.* 2. *p.* 33. *t.* 54.

Rocks and trunks of trees. *Fr.* Apr. — *Plant* of a rigid habit, dark colour and scarcely exceeding an inch in height ; the *leaves* are remarkably straight, obtuse, with a strong and reddish *nerve*. *Capsule* deeply furrowed. *Calyptra* very slightly hairy.

†† *Capsule exserted.*

2. O. *anómalum*, Hedw. (*anomalous Bristle-moss*) ; stems erect, leaves ovato-lanceolate erecto-patent straight when dry, teeth 8 geminate, calyptra slightly hairy. *Hedw. St. Cr. v.* 2. *t.* 37. *Turn. Musc. Hib. p.* 94. *Schwaegr. Suppl. v.* 1. *P. II. p.* 37. *Drum. Musc. Scot. v.* 2. *n.* 50. *Hobs. Br. Mosses, v.* 2. *n.* 43. *Musc. Brit. ed.* 2. *p.* 126. *t.* 21. — *Bryum striatum, β. Linn.* — *Dill. Musc. t.* 55. *f.* 9.

Rocks and walls. *Fr.* Apr. — *Stems* scarcely an inch in height. *Leaves*, when dry, of a tawny brown. *Capsule* tuberculated, *Wils. Teeth* of the *peristome* arched when moist, inclined or erect (never recurved) when dry. — Hedwig appears to have confounded this plant with *O. cupulatum.*

3. O. *Drummóndii*, Hook. (*Mr. Drummond's Bristle-moss*); stems creeping, leaves narrow-lanceolate crisped when dry, capsule elongato-clavate deeply furrowed, calyptra very hairy. *Hook. in Grev. Scot. Cr. Fl. t.* 115. *Drum. Musc. Scot. v.* 1. *n.* 69. *Musc. Brit. ed.* 2. *p.* 126. *Suppl. t.* 4.

Trunks of trees, especially Birches, in alpine glens in the West of Scotland. On a Fir tree, on Turk Mountain, Killarney, *Wils.* First discovered by *Mr. Drummond. Fr.* Aug. — A beautiful species, in some respects resembling *O. crispum*, but differing, even at first sight, by having the branches in the circumference of the tufts decidedly creeping; and still further distinguished by its single *peristome*, which consists of 16 white *teeth*, distinct at the base, but united in pairs at the extremity, spreading horizontally or slightly deflexed.

** *Peristome double.*

† *Capsule immersed.*

4. O. *affíne*, Schrad. (*pale straight-leaved Bristle-moss*); stems erect, leaves erecto-patent flaccid broadly lanceolate, capsule deeply furrowed, teeth of the peristome 8 geminate, cilia filiform, calyptra slightly hairy. *Musc. Brit. ed.* 2. *p.* 127. *t.* 21. — *α. majus;* stems elongated, calyptra especially above hairy. *O. affine, Schrad. Spicil. p.* 67. *Fl. Brit. p.* 263. *E. Bot. t.* 1323. *Turn. Musc. Hib. p.* 96. *Schwaegr. Suppl. v.* 1. *P. II. t.* 49. (*as O. striatum.*) *Hobs. Br. Mosses, v.* 2. *n.* 45. — *Dill. Musc. t.* 55. *f.* 10. — *β. pumilum;* stems very short, calyptra glabrous. *O. pumilum, Sw. Musc. Suec. t.* 4. *f.* 9. *Fl. Brit. p.* 1264. *E. Bot. t.* 2168. *Turn. Musc. Hib. p.* 98. *Schwaegr. Suppl. v.* 1. *P. II. t.* 50.

Trunks of trees and old pales, common. *Fr.* Aug.

5. O. *rupíncola*, Funck, (*Rock Bristle-moss*); stems erect or procumbent, leaves suberect straight rigid broadly lanceolate, capsule furrowed above, teeth 16 patent, calyptra very hairy. *Funck, Deutschl. Moose, t.* 35. *f.* 23. *Grev. Scot. Cr. Fl. t.* 105. *Drum. Musc. Scot. v.* 1. *n.* 57. *Musc. Brit. ed.* 2. *p.* 127. *Suppl. t.* 4. — *O. striatum*, "*Davies' Welch Bot.*"

Rocks and stones, rarely upon trees, in alpine districts. *Fr.* June. — This has a singularly rigid habit. It is more luxuriant than *O. affine*, having a broader *capsule*, a very deciduous *inner peristome* while the *outer* one is erect, never deflexed, and the *calyptra* is more hairy.

6. O. *diáphanum*, Schrad. (*diaphanous-pointed Bristle-Moss*); stems erect very short, leaves lanceolate acuminate diaphanous at the points, calyptra slightly hairy. *Schrad. Spicil. p.* 69. *Fl. Brit. p.* 1265. *E. Bot. t.* 1324. *Schwaegr. Suppl. v.* 1. *p.* 31. *t.* 55. *Hobs. Brit. Mosses, v.* 1. *n.* 55. *Drum. Musc. Scot. v.* 1. *n.* 59. — *O. aristatum, Fl. Brit. p.* 1265. *Turn. Musc. Hib. p.* 100. *t.* 9. *f.* 2.

Trees, walls, and old pales, especially near the sea. *Fr.* Feb. — Readily distinguished by the diaphanous points of the *leaves*. *Teeth* 16, not approximated in pairs.

7. O. *rivuláre*, Sm. (*river Bristle-Moss*); stems procumbent, leaves broadly lanceolate obtuse, cilia setaceous, calyptra glabrous. *Fl. Brit. p.* 1266. *Turn. Musc. Hib. p.* 96. *t.* 8. *E. Bot. t.* 2188. *Hobs. Br. Mosses, v.* 2. *n.* 46. *Drum. Musc. Scot. v.* 2. *n.* 56. *Schwaegr. Suppl. v.* 1. *P. II. p.* 31. *Musc. Brit. ed.* 2. *p.* 128. *t.* 21.

Rocks, in streams. *Fr.* Aug. — Two or three inches long, of a dark lurid-green colour. *Leaves* very obtuse. *Cilia* very slender and arising from the sides of the *teeth*.

8. O. *striátum*, Hedw. (*common Bristle-Moss*); stems erect, leaves lanceolate patent straight when dry, capsule ovate smooth, cilia torulose, calyptra slightly hairy. *Hedw. St. Cr. v.* 2. *t.* 3. *f.* 9? *Fl. Brit. p.* 1263. *E. Bot. t.* 2187. *Turn. Musc. Hib. p.* 95. (*excl. var.* β.) *Hobs. Br. Mosses, v.* 1. *n.* 56. *Drum. Musc. Scot. v.* 1. *n.* 56. *Schwaegr. Suppl. v.* 1. *P. II. p.* 29. *t.* 54. *Musc. Brit. ed.* 2. *p.* 128. *t.* 21.—*Dill. Musc. t.* 55. *f.* 8.

Trunks of trees. *Fr.* June. — *Stems* frequently as tall as in *O. Lyellii*. The *inner peristome* is very peculiar, it is broad, pale-coloured, and composed of moniliform joints, usually arranged in single rows, but not unfrequently having other joints attached to their sides. Here, too, they arise from an inner membrane to the capsule, as in *Hypnum*.

9. O. *Lyéllii*, Hook. and Taylor, (*Mr. Lyell's Bristle-Moss*); stems erect elongated, leaves linear-lanceolate subundulate carinated very acute crisped when dry, capsule oblong furrowed, cilia filiform, calyptra very hairy. *Musc. Brit. ed.* 1. *p.* 76. *ed.* 2. *p.* 129. *t.* 22. *Hobs. Br. Mosses, v.* 2. *n.* 47. *Drum. Musc. Scot. v.* 2. *n.* 57.

First discovered on trees in the New Forest, Hants, by *C. Lyell, Esq.* since ascertained to be not unfrequent throughout Britain, especially in subalpine regions. *Fr.* Aug. — Readily distinguished from the preceding by its long, narrow, and crisped *leaves*, and sessile *fruit*. The *inner peristome* is, too, very different, red, not moniliform, and arising from the side of the teeth. Hedwig has probably confounded the two species, as well as the following, but they are truly distinct.

†† *Capsule exserted.*

+ *Cilia* 8.

10. O. *speciósum*, Nees, (*showy Bristle-Moss*); stems erect, leaves ovato-lanceolate acuminate patent scarcely recurved at the margins and point, capsule slightly furrowed, teeth of the peristome 8 at length separating into 16 and reflexed, calyptra hairy. *Nees ab Esenb. in Sturm. Deutschl. Fl.? — Funck, Deutschl. Moose, t.* 34. *f.* 23. *Drum. Musc. Scot. v.* 2. *n.* 55. *Grev. Scot. Cr. Fl. t.* 137. *Musc. Brit. ed.* 2. *p.* 130. *Suppl. t.* 4. — *O. striatum, Hedw. St. Cr. v.* 2. *t.* 36. *f.* 1—3.?

On trees and stones, Scotland. Near Montrose, *Mr. Reid*. Near Forfar, *Mr. Drummond*. *Fr.* —— ? — The colour of the foliage is reddish-brown.

11. O. *Hutchínsiæ*, Sm. (*Miss Hutchins' Bristle-Moss*); stems erect, leaves lanceolate erect rigid, capsule clavate furrowed, calyptra very hairy. *E. Bot. t.* 2523. *Hobs. Br. Mosses, v.* 2. *n.* 44. *Schwaegr. Suppl. v.* 2. *P. II. p.* 138. *Drum. Musc. Scot. v.* 2. *n.* 33. *Musc. Brit. ed.* 2. *p.* 131. *t.* 21.

On rocks in alpine situations, in England, Scotland and Ireland: first discovered in the latter country by *Miss Hutchins*, near Bantry. *Fr.* May. — This has the *capsule* of *O. crispum*, but the *foliage* more resembling that of *O. anomalum*, of a blackish-brown colour, and as erect when dry as it is when moist. *Seta* often twisted. *Peristome* with its 8 *teeth*, when recurved, deeply and regularly cleft down the middle.

12. O. *Ludwígii*, Brid. (*Ludwigian Bristle-Moss*); stems creeping, leaves erecto-patent narrowly lanceolate crisped when dry, capsule pyriform smooth furrowed only at the extremity, mouth extremely contracted, calyptra remarkably hairy. *Brid. Musc. Suppl. p.* 26. *Schwaegr. Suppl. v.* 1. *P. II. p.* 24. *t.* 51. *Drum. Musc. Scot. v.* 2. *n.* 52. *Grev. Scot. Cr. Fl. t.* 133. *Musc. Brit. ed.* 2. *p.* 132. *Suppl. t.* 4. — *Splachnum Wulfenianum, Schwaegr. Suppl. v.* 1. *p.* 46. *t.* 14.

Frequent on young oaks, in subalpine glens, in various parts of Scotland. *Fr.* Aug. — The *capsule* may distinguish this, at first sight, from every other *Orthotrichum*. The inner *fringe* of the *peristome* is exceedingly fugacious.

13. O. *críspum*, Hedw. (*curled Bristle-Moss*); stems erect, leaves lanceolato-subulate much crisped when dry, capsule oblongo-clavate furrowed, teeth of the peristome 8 geminate patent reflexed, calyptra very hairy. *Hedw. St. Cr. v.* 2. *t.* 35. *Sp. Musc. t.* 162. *Schwaegr. Suppl. v.* 1. *P. II. p.* 23. *Fl. Brit. p.* 1266. *E. Bot. t.* 996. *Hobs. Br. Mosses, v.* 1. *n.* 54. *Drum. Musc. Scot. v.* 1. *n.* 58. — *Bryum striatum*, ♂. *Linn.* — *Dill. Musc. t.* 55. *f.* 11.

Abundant on trees; rarely found upon walls and stones. *Fr.* Aug. — The *leaves* of this common and well-marked species of the genus are frequently infested with a small brown parasite, the *Conferva Orthotrichi*.

+ + *Cilia sixteen.*

14. O. *pulchéllum*, Sm. (*elegant Bristle-Moss*); stems creeping short, leaves narrow-lanceolate crisped when dry, teeth of the peristome 16 approaching in pairs patent (red), calyptra almost glabrous plaited at the base. *E. Bot. t.* 1787. *Hobs. Br. Mosses, v.* 1. *n.* 57. *Drum. Musc. Scot. v.* 1. *n.* 55. *Musc. Brit. ed.* 2. *p.* 134. *t.* 21.

On trunks of trees; particularly in subalpine countries. *Fr.* May. — This is an exceedingly beautiful species, and well deserves the name which Smith has given it. The *capsule*, Mr. Wilson observes, is very generally tuberculated.

B. *Internal peristome formed of a membrane more or less divided into laciniæ.*

27. Brýum. *Linn.* Thread-Moss.

Seta terminal. *Peristome* double: the *outer* of 16 *teeth*; the *inner* of a membrane cut into 16 equal segments, with filiform processes frequently placed between them. *Calyptra* dimidiate. (*Musc. Brit. t.* 3.)—An ancient name of Dioscorides, given by Dillenius to this Genus and its affinities.

1. *Capsules sulcated.* (Mnium, *Brid.* not *Sm.*)

1. B. *andrógynum*, Hedw. (*narrow-leaved Thread-Moss*); stems nearly simple, leaves lanceolate serrated their margins recurved, capsule nearly erect cylindrical sulcated, lid conical. *Hedw. Sp. Musc. p.* 178. *Turn. Musc. Hib. p.* 113. *Musc. Brit. ed.* 2. *p.* 193. *t.* 28.—*Mnium androgynum, Linn.*—*E. Bot. t.* 1328. *Fl. Brit. p.* 1344.—*Gymnocephalus androgynus, Schwaegr. Suppl. v.* 2. *p.* 87. *Dill. Musc. t.* 31. *f.* 1.

In woods and on banks. *Fr.* ——? very rare.—Surface of the *leaf* papillose. The *colour* pale green. The *male flowers*, as Hedwig calls them, form a granular head, terminating an elongated and almost leafless portion of the stem: but these assuredly are gemmæ and quite different from the *anthers* (so called) in other mosses, which *Mr. Wilson* finds mixed with the *pistils*. Hence the name is peculiarly applicable, though Linnæus could not have understood it in this sense.

2. B. *palústre*, Sw. (*Marsh Thread-Moss*); stems much branched, leaves lanceolate obtuse entire their margins revolute, capsule ovate oblique sulcated, lid conical. *Swartz, Musc. Suec.*—*E. Bot. t.* 391. *Turn. Musc. Hib. p.* 113. *Hobs. Br. Mosses, v.* 1. *n.* 97. *Drum. Musc. Scot. v.* 1. *n.* 97.—*Mnium palustre, Linn.*—*Hedw. Sp. Musc. p.* 188. *Schwaegr. Suppl. v.* 1. *P. II. p.* 122. *Fl. Brit. p.* 1346.

Bogs, frequent. *Fr.* June.—Habit of the last, with *leaves* of the same texture; but the plant is much larger. *Male flowers* (of *Hedw.*) discoid. These are besides powdery or granulated heads on elongated naked stems or branches, similar to those of the preceding species: but here, they are looked upon as *gemmæ*. The *inner peristome* of both has a pair of *cilia* between each of the segments, and these segments are cleft from the base almost to the extremity.

2. *Capsule smooth* (*not sulcated*).

a. *Teeth of the outer peristome shorter than the inner.*

(Meesia, *Hedw.*)

3. B. *trichódes*, Linn. (*capillary Thread-Moss*); stems somewhat branched, leaves linear obtuse entire reticulated, capsule narrow-pyriform curved subcernuous, seta very long. *Linn. Fl. Brit. p.* 1350. *E. Bot. t.* 1517. *Hobs. Br. Mosses, v.* 2. *n.* 74. *Drum. Musc. Scot. v.* 1. *n.* 98. *Musc. Brit. ed.* 2.

p. 195. *t.* 28.—*Meesia uliginosa, Hedw. St. Cr. v.* 1. *t.* 1, 2.—*Meesia minor, Brid.*—*Dill. Musc. t.* 48. *f.* 58.

Highland mountains, in wet places. *Fr.* Aug.—*Stems* an inch or more long. *Leaves* erecto-patent, canaliculate; *nerve* strong, disappearing below the point, colour a deep yellow-green, shining.

4. B. *triquétrum*, Turn. (*long-stalked Thread-Moss*); stems elongated branched, leaves lanceolate carinate acute serrated reticulated, capsule pyriform erecto-cernuous, seta exceedingly long. *Turn. Musc. Hib. p.* 115. *E. Bot. t.* 2394. *Musc. Brit. ed.* 2. *p.* 195. *t.* 28.—*Mnium triquetrum, Linn.*—*Meesia longiseta, Hedw. St. Cr. v.* 1. *t.* 22.—*Diplocomium longisetum, Web. et Mohr.*

On the borders of some Lake in the north of Ireland, (?) *Dr. Scott. Fr.* —— ?

5. B. *dealbátum*, Dicks. (*pale-leaved Thread-Moss*); stems short, leaves lanceolate acute plane reticulated serrated at the points, capsule pyriform nearly erect. *Dicks. Cr. Fasc.* 2. *p.* 5. *f.* 3. *Fl. Brit. p.* 1350. *E. Bot. t.* 1571. *Turn. Musc. Hib. p.* 115. *Drum. Musc. Scot. v.* 2. *n.* 88. *Musc. Brit. ed.* 2. *p.* 196. *t.* 28.—*Meesia dealbata, Sw. Musc. Suec. t.* 5. *f.* 10. *Hedw. Sp. Musc. t.* 41. *f.* 6—9.

Boggy mountains and low grounds, not common. *Fr.* Summer.—The *outer teeth* are longer in proportion to the *inner* than in the other species of this division, and their points are less obtuse.

b. *Teeth of the outer peristome as long as the inner.*

* *Leaves without any thickened margin.*

† *Nerve of the leaf not reaching to the point.*

6. B. *squarrósum*, 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 substrumous 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.

7. B. *juláceum*, Schrad. (*slender-branched Thread-Moss*); stems branched, leaves closely imbricated broadly ovate concave entire obtuse, nerve reaching nearly to the point, capsule obovato-cylindraceous pendulous. *Schrad. Spicil. p.* 70. *Fl. Brit. p.* 1357. *E. Bot. t.* 2270. *Musc. Brit. ed.* 2. *p.* 197. *t.* 28. *Schwaegr. Suppl. v.* 2. *P. II. t.* 195.—*B. argenteum*, β. *Linn.*—*Schwaegr. Suppl. v.* 1. *P. II. p.* 188.—*Dill. Musc. t.* 50. *f.* 63.

Sides of streams, moist rocky banks, and sandy places, in alpine districts. *Fr.* Nov. — This is a very beautiful moss; with rather tall slender *stems*, of a yellowish-green colour, and glossy. It has been strangely confounded by continental Botanists with *B. argenteum.*

8. B. *crúdum*, Huds. (*transparent green Thread-Moss*); stems simple, leaves rigid lanceolate erect the upper ones the narrowest and longest all of them plane serrulate, the nerve disappearing below the summit, capsule oblongo-subpyriform cernuous. *Huds. Angl. p.* 491. *E. Bot. t.* 1604. *Fl. Brit. p.* 1361. *Turn. Musc. Hib. p.* 130. *Hobs. Br. Mosses, v.* 2. *n.* 76. *Drum. Musc. Scot. v.* 2. *n.* 80. *Musc. Brit. ed.* 2. *p.* 198. *t.* 28.—*Mnium crudum, Linn.*—*Hedw. St. Cr. v.* 1. *t.* 37.—*Dill. Musc. t.* 51. *f.* 70.

Banks and in the crevices of rocks, in mountainous countries. *Fr.* July. — The *stems* have a singular appearance, from the *leaves*, which become gradually longer towards the extremity and are of a shining yellow-green, not changing their direction when dry. — "The *capsule* is always crooked." *Wils.*

9. B. *cárneum*, Linn. (*soft-leaved Thread-Moss*); stems simple, leaves lanceolate reticulated slightly serrulate at the point, nerve disappearing below the summit, capsule obovate pendulous. *Linn.*—*Turn. Musc. Hib. p.* 119. *Fl. Brit. p.* 1352. *E. Bot. t.* 360. *Hobs. Br. Mosses, v.* 1. *n.* 99. *Musc. Brit. ed.* 2. *p.* 198. *t.* 29.—*B. delicatulum, Hedw. St. Cr. v.* 1. *t.* 30.—*B. pulchellum, Hedw. St. Cr. v.* 3. *t.* 38. *B.*? *Schwaegr. Suppl. v.* 1. *P. II. p.* 91. *Dill. Musc. t.* 50. *f.* 69.

Banks. *Fr.* April. — *Stems* rarely exceeding 2—3 lines in length, often bearing innovations, more frequently throwing out sterile shoots from among the roots. The *leaves* are pale, destitute of the bright green of their congeners, and exhibiting, under a microscope, comparatively large reticulations.

10. B. *álbicans*, Wahl. (*pale-leaved Thread-Moss*); stems branched, leaves ovate acute the upper ones lanceolate subdenticulate reticulated the margins plane, nerve disappearing below the summit, capsule pyriform pendulous. *Wahl. in Web. et Mohr, Cr. Germ. p.* 280. *Brid. Bryol. Univ. v.* 1. *p.* 656.—*Bryum Wahlenbergii, Schwaegr. Suppl. v.* 1. *P. II. t.* 70. (*not Funck, Deutschl. Moose, p.* 47. *t.* 29.)—*Mnium albicans, Wahl. Lapp. p.* 353.—*Hypnum Wahlenbergii, Web. et Mohr, Cr. Germ. p.* 280.

Angus-shire, *C. Lyell, Esq.* In a ravine, Cam-y-neunt, near Aber, North Wales, *Mr. Wilson.* *Fr.* Apr. — This has the *capsules* of *B. turbinatum*, as its discoverer well observes, with *leaves* more like those of *B. carneum:* they are, however, considerably broader. Mr. Wilson thought it might be the little-known *B. annotinum* of Hedw.: — and indeed its *leaves* have a considerable similarity in shape to those of Hedwig's figure (*Sp. Musc. t.* 43.); but the *capsules* are much broader. — This species has probably been confounded with *B. turbinatum* and may not be uncommon. Schwaegrichen's figure is very characteristic.

11. B. *Ludwígii*, Spreng. (*Ludwig's Thread-Moss*); stems

ascending or erect branched with annotinous shoots, leaves ovate rather obtuse the upper ones lanceolate rather distinctly reticulated subserrated concave the margins plane, nerve disappearing below the summit, capsule oblong pendulous. *Spreng. MSS. Schwaegr. Suppl. v.* 1. *P. II. p.* 95. *t.* 68. *Funck, Deutschl. Moose, t.* 29. *n.* 9.

Clova mountains, at a considerable elevation, in sandy places where water has stood, *Arnott, Drummond, Greville, Hooker.* This was found in considerable plenty in Clova, in 1824. *Fr.* Sept. scarcely mature. — It grows upon the ground in exposed situations in large compact tufts, and has a peculiar aspect, by which it is more easily distinguished than by words. The shoots of two, three, or more years rise, one upon the top of another, the upper ones only bearing perfect and green foliage ; they are reddish. *Leaves*, when dry, glossy, scarcely twisted, obtuse, broad, concave, of a thin texture with a strong *nerve* disappearing below the summit. *Capsule* oblong, approaching to oval, slightly contracted at the base. This moss agrees well with the specimen of *B. Ludwigii*, in Funck, and with the figure in Schwaegrichen.

12. B. *argénteum*, Linn. (*silvery Thread-Moss*) ; stems branched, leaves closely imbricated broadly ovate suddenly and sharply acuminated subserrulate very concave, the nerve disappearing below the point, capsule ovato-pyriform pendulous. *Linn. Sp. Pl. p.* 1386. *Turn. Musc. Hib. p.* 122. *Fl. Brit. p.* 1358. *E. Bot. t.* 1602. *Hobs. Br. Mosses, v.* 1. *n.* 98. *Drum. Musc. Scot. v.* 2. *n.* 90. *Musc. Brit. ed.* 2. *p.* 199. *t.* 29. *Dill. Musc. t.* 50. *f.* 62.

On the ground, and on walls and roofs of houses, very common. *Fr.* March. — This plant has, as its name implies, a very silvery hue, the upper portion of the *leaves* being scariose and white, while the lower part is green. The acuminated points, especially when dry, are patent and resemble hairs.

13. B. *Ziérii, Dicks.* (*Zierian Thread-Moss*); stems branched, leaves closely imbricated more or less broadly ovate acuminate very concave reticulated entire, nerve running nearly to the point, capsule clavate cernuous. *Dicks. Cr. Fasc.* 1. *t.* 4. *f.* 10. *Hedw. Sp. Musc. t.* 44. *f.* 1—4. *Turn. Musc. Hib. p.* 123. *Fl. Brit. p.* 1356. *E. Bot. t.* 1021. *Drum. Musc. Scot. v.* 2. *n.* 91. *Musc. Brit. ed.* 2. *p.* 199. *t.* 29.

Mountains of England, Wales, Scotland and Ireland. *Fr.* July.

†† *Nerve of the leaf reaching to the point or beyond it.*

14. B. *pyrifórme*, Sw. (*pear-fruited Thread-Moss*) ; stems slightly branched, leaves subulato-setaceous flexuose serrated their nerve very broad, capsule pyriform pendulous. *Swartz, Musc. Suec.* — *Hobs. Br. Mosses, v.* 2. *n.* 75. *Musc. Brit. ed.* 2. *p.* 196. *t.* 28. — *B. aureum, Turn. Musc. Hib. p.* 118. *Fl. Brit. p.* 1348. *E. Bot. t.* 389. — *Webera pyriformis, Hedw. St. Cr. v.* 1. *t.* 3. — *Mnium pyriforme, Linn.* — *Dill. Musc. t.* 50. *f.* 60.

Rocks, especially of sandstone. Not unfrequent on garden-pots,

especially in stoves and green-houses. *Fr.* June.—This differs from all other *Brya* in the remarkable shape of its *leaves*, which are almost wholly composed of *nerve*, except at the base, and there deeply serrated. The *capsules* and *setæ* are a bright orange colour when mature.

15. B. *capilláre*, Linn. (*greater matted Thread-Moss*); stems short, leaves obovate twisted when dry entire their nerve produced into a hair-like point, their margins slightly thickened, capsule oblong pendulous. *Linn. Sp. Pl. p.* 1586. *Turn. Musc. Hib. p.* 120. *Fl. Brit. p.* 1387. *E. Bot. t.* 2007. *Schwaegr. Suppl. t.* 74. *Hobs. Br. Mosses, v.* 2. *n.* 78. *Drum. Musc. Scot. v.* 2. *n.* 93. *Musc. Brit. ed.* 2. *p.* 200. *t.* 29.—*B. annotinum, E. Bot. t.* 1862, (the fructified specimens).—*B. stellare, E. Bot. t.* 2434. *Dill. Musc. t.* 50. *f.* 67.

Heaths, rocks, walls, &c. *Fr.* May.—Readily distinguished from the following by its obovate *leaves*, twisted when dry, their *nerve* extended into a long hair-like point, and by the greater length of its *capsule*.

16. B. *cæspititium*, Linn. (*lesser matted Thread-Moss*); stems short, leaves ovate acuminated entire or very obscurely serrated at the points their margins slightly recurved, the nerve reaching to or beyond the point, capsule ovali-pyriform pendulous. *Linn. Sp. Pl.*—*Turn. Musc. Hib. p.* 120. *Fl. Brit. p.* 1354. *E. Bot. t.* 1904. *Hobs. Br. Mosses, v.* 1. *n.* 100. *Dill. Musc. t.* 50. *f.* 66.—*β. minus. B. bicolor, Dicks. Cr. Fasc.* 4. *p.* 16. *Turn. Musc. Hib. t.* 11. *f.* 2. *Fl. Brit. p.* 1358. *E. Bot. t.* 1601.

Banks, walls, and roofs of houses, very frequent. *Fr.* May.—That this most common of mosses is very variable, every one will allow, who has been accustomed to examine it in different situations, and under different circumstances: and the German Botanists, especially, seem to me to have unnecessarily raised these varieties into species. These have been mentioned in the *Muscologia Britannica*. I had, indeed, there, though with a mark of doubt, included the *B. Wahlenbergii* of Mohr, (*B. albicans, Wahl*): but that plant I am now disposed to keep distinct and to place near *B. carneum*.

17. B. *turbinátum*, Sw. (*turbinate Thread-Moss*); stems short branched with innovations, leaves ovate acuminate nearly entire their margins slightly recurved, the nerve running beyond the points, capsule elongato-pyriform pendulous. *Swartz, Musc. Suec. p.* 49. *Fl. Brit. p.* 1366. *E. Bot. t.* 1572. *Hobs. Br. Mosses, v.* 1. *n.* 101. *Drum. Musc. Scot. v.* 2. *n.* 94. *Schwaegr. Suppl. v.* 1. *P. II. p.* 19. *Musc. Brit. ed.* 2. *p.* 202. *t.* 29.—*Mnium turbinatum, Hedw. St. Cr. v.* 3. *t.* 8.—*Bryum interruptum, Fl. Brit. p.* 1363. *E. Bot. t.* 2371?—*B. nigricans, Dicks.*—*Fl. Brit. p.* 1363. *E. Bot. t.* 1528. (To this list of synonyms are added, in *Musc. Brit.*, *B. boreale, pallescens, pallens, longisetum* and *Schleicheri? Pohlia inclinata* and *Webera intermedia* of *Schwaegr.* and *B. flagellare, Funck.*)—*Dill. Musc. t.* 51. *f.* 74.

Wet, sandy, and stony places, especially in mountainous countries. *Fr.* July.—This, too, is a moss very difficult to be defined in words; it borders, on the one hand, upon *B. cæspititium*, and, on the other, upon

B. ventricosum. It is best distinguished from them by its pyriform *capsule*.

18. B. *nútans*, Schreb. (*silky pendulous Thread-Moss*); stems short, leaves erect lanceolate acuminate serrated above, nerve reaching to the point, capsule oblongo-pyriform pendulous. *Schreb. Fl. Lips. p.* 81. *Turn. Musc. Hib. p.* 117. *Fl. Brit. p.* 1347. *E. Bot. t.* 1240. *Hobs. Br. Mosses, v.* 1. *n.* 107. *Drum. Musc. Scot. v.* 1. *n.* 99. *Musc. Brit. ed.* 2. *p.* 204. *t.* 29. — *Webera nutans, Hedw. St. Cr. v.* 1. *t.* 4. — *Bryum compactum, E. Bot. t.* 1257? — *B. Wahlenbergii, Funck, Deutschl. Moose, (not Schwaegr.)* — *Dill. Musc. t.* 50. *f.* 61.

Walls, in rocky places and on heaths. *Fr.* May. — The *leaves* are yellow-green, glossy, narrower upwards on the fertile shoots, all nearly linear on the barren ones. *Setæ* bright orange-red when mature, at which period, especially when dry, the *capsules* are far more pyriform than when younger.

19. B. *elongátum*, Dicks. (*long-necked Thread-Moss*); stems short, leaves erect elongato-lanceolate acuminate serrated, nerve reaching to the point, capsule elongato-clavate inclined (rarely drooping). *Dicks. Cr. Fasc.* 2. *p.* 8. *Turn. Musc. Hib. p.* 114. *Fl. Brit. p.* 1349. *E. Bot. t.* 1003. *Hobs. Br. Mosses, v.* 1. *n.* 102. *Drum. Musc. Scot. v.* 1. *n.* 100. *Musc. Brit. ed.* 2. *p.* 204. *t.* 30. — *Pohlia elongata, Hedw. St. Cr. v.* 1. *t.* 36. — *Pohlia minor, Schwaegr. Suppl. v.* 1. *P. II. t.* 64. — *Webera alpina, Funck.* — *Bryum longicollum, Sw. Musc. Suec. t.* 6. *f.* 13. — *B. cylindricum, Dicks. Cr. Fasc.* 4. *t.* 11. *f.* 4. *Fl. Brit. p.* 1351.

Mountains, especially in the clefts of rocks and in caves. *Fr.* July. —Allied to *B. crudum*, and the foliage is equally rigid and glossy, but the *capsule* is very different. The *peristome* is that of a *Pohlia*; that is, the *inner peristome* wants the intermediate *cilia*.

20. B. *alpínum*, Linn. (*red alpine Thread-Moss*); stems elongated rigid branched, leaves closely imbricated erect lanceolate somewhat obtuse subserrulate at the apex the margins revolute, nerve reaching to the points, capsule oblongo-ovate pendulous. — *Linn. Mant. v.* 2. *p.* 309. *Turn. Musc. Hib. p.* 125. *Fl. Brit. p.* 1358. *E. Bot. t.* 1263. *Schwaegr. Suppl. v.* 1. *P. II. t.* 73. *Hobs. Br. Mosses, v.* 2. *n.* 79. *Musc. Brit. ed.* 2. *p.* 205. *t.* 28. — *Dill. Musc. t.* 50. *f.* 64.

Low, moist, exposed rocks, in subalpine countries; common. *Fr.* June. — This species is readily known by its densely imbricated erect *leaves*, of a deep shining purple colour.

21. B. *ventricósum*, Dicks. (*swelling Bog Thread-Moss*); stems elongated branched with innovations, leaves oblong acuminated scarcely serrulate the margins recurved, nerve reaching beyond the point, capsule oblongo-ovate pendulous. *Dicks. Cr. Fasc.* 1. *p.* 4. *Turn. Musc. Hib. p.* 126. *Fl. Brit. p.* 1365. *E. Bot. t.* 2270. *Hobs. Br. Mosses, v.* 1. *n.* 103. *Musc. Brit. ed.* 2. *p.* 205. *t.* 30. — *B. bimum, Schreb.* — *Turn.*

Musc. Hib. p. 127. *Fl. Brit. p.* 1368. *E. Bot. p.* 1518.—*B. cubitale, Dicks. Cr. Fasc.* 2. *t.* 5. *Fl. Brit. p.* 1364. *E. Bot. t.* 2554.—*Mnium pseudo-triquetrum, Hedw. St. Cr. v.* 3. *t.* 7.—*Dill. Musc. t.* 51. *f.* 72.

Marshy ground, in alpine and subalpine countries, and in the moist crevices of rocks. *Fr.* July. — *Stems* 2—4 inches or more high, including the innovations, which are copious, often of a deep brown or reddish colour, of which the foliage partakes to a degree. The *leaves* are generally erecto-patent, the *nerve* reddish, the margins revolute, the base more or less decurrent.

22. B. *demíssum*, Hook. (*club-fruited Thread-Moss*); stems very short branched, leaves ovate cuspidato-acuminate reticulated, their nerve excurrent, seta arched, capsule curved and pyriform, the mouth oblique. *Musc. Exot. v.* 2. *t.* 99. *Grev. Scot. Cr. Fl. t.* 92.—*Meesia demissa, Hoppe and Hornsch.*—*Funck, Deutschl. Moose, t.* 28. *n.* 4.

Rocks, upon Craigalleach and other mountains of the Breadalbane range, always in much elevated and very exposed situations. *Fr.* Aug. — A distinct and highly beautiful moss, inhabiting several remote alpine districts in Europe, but apparently no where abundant.

23. B. *róseum*, Schreb. (*rosaceous Thyme Thread-Moss*); leaves spreading obovato-spathulate acute serrated waved, nerve reaching to the point, capsule oblongo-ovate pendulous. *Schreb. Fl. Lips. p.* 84. *Turn. Musc. Hib. p.* 132. *Fl. Brit. p.* 1370. *E. Bot. t.* 2395. *Hobs. Br. Mosses, v.* 2. *n.* 76. *Drum. Musc. Scot. v.* 2. *n.* 92. *Musc. Brit. ed.* 2. *p.* 200. *t.* 29.—*Mnium roseum, Hedw.*—*Schwaegr. Suppl. v.* 1. *P. II. p.* 135.—*Dill. Musc. t.* 52. *f.* 77.

Banks and on heaths, particularly in sub-mountainous countries. *Fr.* (rare) Nov.—This fine species, with the following (except *B. Tozeri*), form a natural groupe (*Mnium* of Schwaegr. not of Sm. nor Brid.) distinguished by their large lax lurid or deep green foliage, and their barren *stems* which are often creeping. The *inner peristome* is of a firm and rigid texture. The present and the following species have perhaps the largest leaves of any British moss; and these are collected on the top of the stem where they spread out horizontally.

** *Leaves with their margins evidently thickened.*

24. B. *ligulátum*, Schreb. (*long-leaved Thyme Thread-Moss*); stems elongated, leaves undulate lingulate reticulated their margins thickened denticulate, the nerve reaching a little beyond the point, capsule ovate pendulous, lid conical. *Schreb. Fl. Lips. p.* 84. *Fl. Brit. p.* 1371. *E. Bot. t.* 1449. *Hobs. Br. Mosses, v.* 1. *n.* 105. *Drum. Musc. Scot. v.* 2. *n.* 96. *Musc. Brit. ed.* 2. *p.* 207. *t.* 30.—*B. undulatum, Turn. Musc. Hib. p.* 133.—*Mnium undul. Hedw.*—*Mnium serpyllifolium, δ. Linn.*—*Dill. Musc. t.* 59. *f.* 76.

Moist banks and in woods, common. *Fr.* Apr. — This is one of the largest and handsomest of all mosses. Many bright-coloured *setæ* fre-

quently arise from the same point. When the *setæ* are numerous, some of the outer ones are axillary. *Wils.*

25. B. *punctátum*, Schreb. (*dotted Thyme Thread-Moss*); stems elongated, leaves obovato-rotundate very obtuse reticulated their margins thickened entire, the nerve disappearing below the summit, capsule ovate pendulous, lid shortly rostrate. *Schreb. Fl. Lips. p.* 85. *Turn. Musc. Hib. p.* 132. *Fl. Brit. p.* 1368. *E. Bot. t.* 1183. *Hobs. Br. Mosses, v.* 1. *n.* 104. *Drum. Musc. Scot. v.* 2. *n.* 45. *Musc. Brit. ed.* 2. *p.* 207. *t.* 30. —*Mnium punctatum, Hedw.*—*Mnium serpyllifolium, α. Linn.*—*Dill. Musc. t.* 53. *f.* 81.—*β. aquaticum;* leaves larger longer more succulent the margins scarcely thickened.

Boggy places, particularly among the roots of Alders and by the sides of rocky streams. *β.* Clova, *Mr. Drummond.* On Catlaw, Kinnordy, Angus-shire; *Arnott, Hooker. Fr.* April. — The *leaves* of the *var. β.* are of a softer greener texture and more succulent than in *α.*

26. B. *rostrátum*, Schrad. (*long-beaked Thyme Thread-Moss*); stems elongated, leaves broadly ovate reticulated their margins thick obtuse denticulated, nerve reaching a little beyond the point, capsule ovate pendulous, lid rostrate. *Schreb. Spicil. p.* 72. *Fl. Brit. p.* 1369. *E. Bot. t.* 1475. *Drum. Musc. Scot. v.* 2. *n.* 97. *Musc. Brit. ed.* 2. *p.* 208. *t.* 30. — *Mnium rostratum, Schwaegr. Suppl. v.* 1. *P. II. p.* 136. *t.* 79. — *Dill. Musc. t.* 53. *f.* 80.

Moist shady places, in subalpine countries. Yorkshire, *Rev. J. Dalton.* Near Bangor, Anglesea, and Cotteral Clough, Cheshire; *Mr. Wilson. Fr.* May. — The *setæ* are 1—5, sometimes 7 (*Mr. Wilson*), from the same point.

27. B. *marginátum*, Dicks. (*thick-edged Thyme Thread-Moss*); stems elongated, leaves ovate acute reticulated their margins thickened serrated, nerve reaching a little beyond the point, capsule ovate (or oblong) pendulous, lid shortly rostrate. *Dicks. Cr. Fasc,* 2. *t.* 5. *f.* 1. *Turn. Musc. Hib. p.* 129. *Fl. Brit. p.* 1362. *E. Bot. t.* 1493. *Drum. Musc. Scot. v.* 2. *n.* 98. *Musc. Brit. ed.* 2. *p.* 208. *t.* 31.—*B. serratum, Schrad.*—*Mnium serratum, Schwaegr. Suppl. v.* 1. *P. II. t.* 78.

Woods and shaded banks, in the north of England, Wales, and Ireland. Not unfrequent in Scotland. *Fr.* June. — When seen under a microscope, the margins and *nerve* of the *leaf* are of a deep blood colour and the *calyptra* is of a red or orange hue. No one has studied this groupe of Mosses more successfully than the Rev. Mr. Dalton of Croft, and to him I am indebted for much information respecting the various species of it.

28. B. *hórnum*, Schreb. (*Swan's-neck Thyme Thread-Moss*); stems elongated, leaves lanceolate acute reticulated their margins thickened denticulate, nerve generally disappearing below the summit, capsule oblongo-ovate pendulous, lid hemisphærical mucronulate. *Schreb. Fl. Lips. p.* 83. *Turn. Musc. Hib. p.* 128. *Fl. Brit. p.* 1360. *E. Bot. t.* 2271. *Hobs. Br.*

Mosses, v. 1. *n.* 106. *Drum. Musc. Scot. v.* 2. *n.* 100. *Musc. Brit. ed.* 2. *p.* 209. *t.* 31.—*Mnium hornum, Linn.*—*Dill. Musc. t.* 51. *f.* 71.

Marshy places and in wet woods. *Fr.* Apr.—The whole plant is of a lurid yellowish-green colour, the *leaves* very narrow, the *lid* hemisphærical with a short point. The perforation of the *calyptra* and its adhesion to the *seta* below the *capsule*, as in *Timmia cucullata*, is a common occurrence in this species.

29. B. *cuspidátum*, Schreb. (*pointed-leaved Thyme Thread-Moss*); stems elongated, leaves obovate acuminulate reticulated their margins thickened denticulated in the upper half, nerve running beyond the point, seta mostly solitary, capsule ovate pendulous, lid conico-hemisphærical obtuse. *Schreb. Fl. Lips. p.* 84. *Turn. Musc. Hib. p.* 131. *Fl. Brit. p.* 1368. *E. Bot. t.* 1474. *Drum. Musc. Scot. v.* 2. *n.* 99. *Musc. Brit. ed.* 2. *p.* 209. *t.* 31.—*Mnium cuspidatum, Hedw.*—*Schwaegr. Suppl. v.* 1. *P. II. p.* 132. *Hedw. Sp. Musc. t.* 45. *f.* 5, 6. 8.?—*Dill. Musc. t.* 53. *f.* 79. *A—L.*

Woods and on wet banks, in shady situations. *Fr.* Apr.—Smaller than the last, and more lax, with creeping *shoots*, which, as Mr. Dalton observes, take root at the extremity: *leaves* broader and of a softer texture. *Stems* an inch or an inch and a half high. (*Inner peristome* curiously perforated.) *Wils.*

30. B. *affine*, Brid. (*many-stalked Thyme Thread-Moss*); stems elongated, leaves broadly elliptical acuminulate reticulated their margins thickened denticulated to the very base, the nerve reaching to or beyond the point, setæ aggregated, capsule oblong pendulous, lid conical with a mucro. *Brid. Mant. Musc. p.* 119.—*Mnium affine, Blandov, Musc. Exsicc. III. n.* 133. *Schwaegr. Suppl. v.* 1. *P. II. p.* 134. *Funck, Deutschl. Moose, t.* 33. *n.* 12.—*Mnium cuspidatum, Hedw. Sp. Musc. t.* 45. *f.* 7. (and *f.* 5, 6. 8.?)—*Mnium serpyllifolium*, β. *cuspidatum, Linn.* (*excl. Syn. Dill. f.* 79. *A—L.*)—*Dill. Musc. t.* 55. *f.* 79. *M.* (*specimen from Vaillant.*)—*Wils. in E. Bot. Suppl. t.* 2739.

Wood near Over, fertile; also with abortive pistils on a hedge-bank at Little Farm near Over, Cheshire, *Mr. Wilson*, 1828. Wood at Mildenhall, Suffolk, bearing fruit abundantly in the dark recesses, *F. K. Eagle, Esq. Fr.* Apr. May.—Twice the size of the former and truly distinct from it by the characters above given. It appears to have been found, for the first time in England, by the two very able Botanists just mentioned, and nearly at the same period. In the Suffolk station it bears fruit most copiously in a fir plantation: but the *capsules* seldom become perfectly ripe, partly, as it would appear, on account of the drought, and partly because they are the favourite food of hares and rabbits. The dark lurid colour of the foliage, Mr. Eagle observes, is very striking, but the young shoots are of a light green.

31. B. *Tozéri*, Grev. (*minute diaphanous Thread-Moss*); "stems short simple erect, leaves remote spreading obovate entire cuspidate margined loosely reticulated, the nerve disap-

pearing beyond the middle, capsule drooping somewhat pear-shaped, lid convexo-conical." *Grev: Scot. Cr. Fl. t.* 285.

Clay banks by the river Dart, Devonshire, *Rev. J. S. Tozer. Fr.* —— ?. — I am indebted to Mr. Tozer for specimens of this moss, which he finds very sparingly indeed, and I can bear testimony to the accuracy of Dr. Greville's figure and description. I have arranged this species here on account of the decidedly thickened margins of the leaf; but its affinity is far removed from the present division: yet I cannot say to which it is most allied. The very lax reticulation of the *leaves*, taken in conjunction with their form, the turbinate *capsule* and small size of the plant, are quite peculiar. The foliage is of a reddish hue, especially the margins and nerve.

28. Tímmia. *Hedw.* Timmia.

Seta terminal. *Peristome* double: the *outer* of 16 *teeth*; the *inner* a plaited membrane, cut into 32 equal *cilia*, variously united at the base by transverse bars and frequently cohering at the points. *Calyptra* dimidiate. (*Musc. Brit. Suppl. t.* 6.) —Named in honour of *J. C. Timm*, a German, and author of a *Flora Megapolitana.*

1. T. *megapolitána*, Hedw. (*Mecklenburg Timmia.*)—*α.* capsule inclined. *T. megapolitana, Hedw. St. Cr. v.* 1. *t.* 31. *Schwaegr. Suppl. v.* 1. *P. II. p.* 84. *Musc. Brit. ed.* 2. *p.* 191. *Suppl. t.* 6.—*T. cucullata*, (the veil persistent on the seta.) *Mich. Am. v.* 2. *p.* 304.—*β.* capsule cernuous. *T. austriaca, Hedw. Sp. Musc. p.* 176. *t.* 42. *f.* 1—7. *Schwaegr. Suppl. v.* 1. *P. II. p.* 84.

Rocks on the banks of the Islay, above Airly Casle, Angus-shire; discovered by *Mr. Drummond* in 1824: always barren. —— This grows in dense tufts, 3—4 inches high, erect, slightly branched, brown below, green above. *Leaves* linear-lanceolate, erecto-patent, plane or somewhat recurved at the margin, serrated, slightly carinate, with a strong *nerve* reaching to the point, crisped when dry. *Capsule* oblongo-obovate. *Lid* hemisphærical, slightly mammillate. — The American state of the plant is remarkable for having the seta passing through the fissure of the *calyptra*, which then remains attached to it.

29. Bartrámia. *Hedw.* Apple-Moss.

Seta terminal. *Capsule* subglobose. *Peristome* double: the *outer* of 16 *teeth*; the *inner* of a membrane divided into 16 bifid segments. *Calyptra* dimidiate. (*Musc. Brit. t.* 3.)—Named in compliment to *John Bartram*, an American Botanist and traveller.

* *Seta, elongated, straight.*

1. B. *pomifórmis*, Hedw. (*common-Apple-Moss*); leaves patent subulate strongly serrated twisted when dry, the nerve reaching to the summit. *Musc. Brit. ed.* 2. *p.* 144. *t.* 23.—*α. minor*; stems short, leaves flexuose. *B. pomiformis, Hedw. Sp. Musc. p.* 164. *Fl. Brit. p.* 1340. *E. Bot. t.* 998. *Turn. Musc. Hib. p.* 108. *Schwaegr. Suppl. v.* 1. *P. II. p.* 145. *t.* 58. *Hobs. Br. Mosses, v.* 1. *n.* 60. *Drum. Musc. Scot. v.* 1. *n.* 65.—*B. crispa, Sw.*

—*Bryum pomiforme, Linn.—Dill. Musc. t.* 44. *f.* 1. *β. major;* stems much elongated branched, leaves longer crisped especially when dry. *Hook. in Fl. Lond. cum Ic.—B. crispa, Brid. Musc. v.* 2. *P. III. t.* 1. *f.* 4. *E. Bot. t.* 1526. *Schwaegr. Suppl. v.* 1. *P. II. p.* 146. *t.* 59.

Heaths and dry banks. *β.* Principally in subalpine countries.— *Fr.* Apr. May.

2. B. *ithiphýlla,* Brid. (*straight-leaved Apple-Moss*); stems short, leaves rigid erecto-patent subulato-setaceous almost entire, the nerve half-way up passing into the substance of the leaf, straight when dry, seta much elongated. *Brid. Musc. v.* 2. *p.* 1. *t.* 6. *E. Bot. t.* 1710. *Schwaegr. Suppl. v.* 1. *P. II. p.* 51. *t.* 60.? *Hobs. Br. Mosses, v.* 2. *n.* 53. *Drum. Musc. Scot. v.* 1. *n.* 66. *Musc. Brit. ed.* 2. *p.* 145. *t.* 23.

Dry banks, in mountainous situations. *Fr.* Spring. — *Stems* tufted, as in all of this genus. Distinguished from the preceding by its straight rigid *leaves* and their more glaucous colour. These leaves are scarcely at all serrated and only so towards the extremity; and the *nerve*, when it reaches the middle, dilates and unites with the substance of the leaf, which hence becomes thick and rigid, remaining nearly as straight when dry as it is when moist.

3. B. *grácilis,* Flörke, (*slender Apple-Moss*); stems elongated, leaves recurvo-patent lanceolate canaliculate serrated, seta lateral from innovations. *Flörke in Schrad. Journ.—Fl. Brit. p.* 1341. *E. Bot. t.* 1826. *Drum. Musc. Scot. v.* 1. *n.* 70. *Musc. Brit. ed.* 2. *p.* 146. *t.* 23. — *B. Œderiana, Sw.* — *B. Œderi, Schwaegr. Suppl. v.* 1. *P. II. p.* 49. *t.* 50.

Rocks, in alpine districts. *Fr.* June. — In this and other species of the genus, there is often an appearance of the *seta* being lateral, from innovations of the *stems*, which are from 1—4 inches in length, erect. *Leaves* short, patent and recurved when wet.

4. B. *fontána,* Sw. (*Fountain Apple-Moss*); stems fastigiate, leaves closely imbricated rigid erect broadly ovate or lanceolate acuminate nearly plane serrated, seta lateral from innovations. *Musc. Brit. ed.* 2. *p.* 146. *t.* 23.—*α. major;* stems from 3—6 inches in height, leaves broadly ovate acuminate. *B. fontana, Swartz, in Schrad. Journ.—Turn. Musc. Hib. p.* 107. *Hobs. Br. Mosses, v.* 1. *n.* 61. *Drum. Musc. Scot. v.* 1. *n.* 68. *Schwaegr. Suppl. v.* 1. *P. II. p.* 61.—*Mnium fontanum, Linn.—Hedw. Sp. Musc.—Bryum fontanum, E. Bot. t.* 390. *Dill. Musc. t.* 44. *f.* 2.—*β. marchica;* stems from half an inch to an inch long, leaves lanceolate acuminated. *B. marchica, Sw.—Schwaegr. Suppl. v.* 1. *P. II. p.* 59. *E. Bot. t.* 2074.—*Mnium marchicum, Hedw. St. Cr. v.* 2. *t.* 39.—*B. fontana, β. pumila, Turn. Musc. Hib. p.* 107. *t.* 10. *f.* 1.

About springs and wet places, in a turfy soil. *Fr. July.* — This varies much in size and somewhat in the direction of the foliage; but may always be known by its erect rigid *leaves*, of a glaucous hue, and by their form.

** *Seta very short, curved.*

5. B. *Halleriána*, Hedw. (*Hallerian Apple-Moss*); stems much elongated proliferous, leaves long subulate flexuose serrated above, seta lateral from innovations very short curved. *Hedw. St. Cr. v.* 2. *t.* 40. *Turn. Musc. Hib. p.* 109. *Fl. Brit. p.* 1339. *E. Bot. t.* 997. *Hobs. Br. Mosses, v.* 2. *n.* 54. *Drum. Musc. Scot. v.* 1. *n.* 57. *Schwaegr. Suppl. v.* 1. *P. II. p.* 64. *Musc. Brit. ed.* 2. *p.* 147. *t.* 23.—*Bryum laterale, Dicks.*

Crevices of rocks, frequent in mountainous countries. *Fr.* June.—The foliage of this has considerable affinity with that of *B. pomiformis:* but the *stems* are generally longer, clothed with thick ferruginous downy roots among the *leaves*, exceedingly proliferous, throwing out their shoots from the summits, whence, the fruit, of 2 or 3 preceding years still remaining, has the appearance of being lateral.

6. B. *arcuáta*, Brid. (*curve-stalked Apple-Moss*); stems much elongated proliferous, leaves horizontally patent ovato-lanceolate acuminated serrated striated, seta very short arcuate at length lateral, capsule not furrowed. *Brid. Musc. v.* 4. *p.* 139. *Turn. Musc. Hib. p.* 109. *E. Bot. t.* 1237. *Schwaegr. Suppl. v.* 1. *P. II. p.* 61. *t.* 62. *Musc. Brit. ed.* 2. *p.* 148. *t.* 23.—*Mnium arcuatum, Dicks. Cr. Fasc.* 3. *p.* 2. *t.* 7. *f.* 3.—*Hypnum chrysocomum, Dicks. Cr. Fasc.* 2. *p.* 12.

Wet banks and among rocks in alpine districts, rare in fructification. *Fr.* Winter.—This extremely beautiful moss, so frequent with us, seems to be wholly unknown upon the continent. It is at once distinguishable by its perfectly globose, large and smooth (at length furrowed) *capsules*, by the flexible *stems* and rigid *leaves* which never become twisted or curled in drying.

30. Buxbaúmia. *Linn.* Buxbaumia.

Capsule oblique, gibbous. *Peristome* double: the *outer* of numerous filiform, erect, jointless *teeth;* the *inner* a plaited membranous cone. *Calyptra* mitriform, minute. (*Musc. Brit. t.* 3.)—Named in honour of *J. C. Buxbaum*, a German botanist and author of a catalogue of plants of the environs of Halle, who first detected this curious plant in Russia.

1. B. *aphýlla*, Linn. (*leafless Buxbaumia*). *Linn. Sp. Pl. p.* 1570. *Fl. Brit. p.* 1148. *E. Bot. t.* 1596. *Hook. in Fl. Lond. cum Ic. Schwaegr. Suppl. v.* 1. *P. II. p.* 63. *Musc. Brit. ed.* 2. *p.* 143. *t.* 22.—*B. viridis, Mong. et Nestl. n.* 724.—*B. indusiata, Brid. Bryol. Univ. v.* 1. *p.* 331. *Suppl. p.* 2. *Dill. Musc. t.* 68. *f.* 5.

On the ground, generally in woods, very rare: first discovered at Sprowston near Norwich, in a fir plantation. Near Rosslyn, *Mr. E. Maughan.* Wood near Aberdeen, *Mr. Jackson.* Selkirkshire, near the borders of Peebleshire, *Mr. J. Stewart.* Georgetown hill, one of the Lomonds, Fifeshire, 1,100 feet above the sea, a very exposed spot, *Mr. Arnott. Fr.* March.—The *stem*, if it may be so called, is reduced to a little conical bulb, clothed with minute scales, which Mr. R. Brown has ascertained to be *leaves;* from this arises a red tuberculated *seta*,

about an inch high. *Apophysis* small, cylindrical. *Capsule* large, ovate, oblique, nearly flat above, convex below, gibbous at the base; at the mouth is a rim or border, which is broken or cleft irregularly. *Lid* small, conical.

SECT. II. *Seta or fruitstalk lateral.* PLEUROCARPI.[1]

SUBSECT. I. *Mouth of the capsule naked.* GYMNOSTOMI.

31. HEDWÍGIA. *Hook. (in Humb. Nov. Gen.)* Hedwigia.

Seta lateral. *Mouth* of the *capsule* naked. *Calyptra* dimidiate.—Named in honour of the prince of Muscologists, *J. G. Hedwig.*

1. H. *æstíva*, (*Summer Hedwigia*); stems elongated densely tufted, leaves lanceolate twisted when dry, capsule oval smooth, lid with a long oblique subulate beak.—*Gymnostomum æstivum, Hedw. Sp. Musc. p.* 32. *t.* 11. *f.* 4—7. *Schwaegr. Suppl. v.* 1. *p.* 30. *Hobs. Br. Mosses, v.* 2. *n.* 6. *Drum. Musc. Scot. v.* 2. *n.* 5. *Musc. Brit. ed.* 2. *p.* 18. *t.* 6.—*G. luteolum, E. Bot. t.* 20. (*not of Fl. Brit. according to Mr. Davies' specimens*).—*Anictangium compactum, Schwaegr. Suppl. v.* 1. *p.* 36. *t.* 11.

Wet rocks, especially near water-falls, frequent. *Fr.* Sept. — The *fructification* of this is truly lateral, as my friend *Mr. Wilson*, has satisfied me; and along with the *Gymnostomum*[2] *Hornschuchianum* of the *Bryologia Germanica*, to which it is closely allied (differing in its much shorter leaves), it must be removed from *Gymnostomum*. The Genus *Hedwigia* was established by Ehrhart (and adopted by Hedwig himself) upon the present *Anictangium ciliatum;* a plant with which ours has been united generically, by succeeding Botanists, who have, nevertheless, without sufficient reason, deprived our great Muscologist of a name among Mosses, suffered the plant to merge into *Gymnostomum*, or formed of it the Genus *Anictangium*, and allowed a phænogamous plant to usurp the appellation. I have ventured to separate a groupe from *Anictangium* in the *Musci Exotici*, in *Humbolt's Nova Genera*, and in the *Musc. Brit.*, which will include the present plant: and this arrangement has already been sanctioned by the Authors of the Dictionnaire Classique d'Hist. Nat. and by Schwaegrichen in the 2d and 3d Supplements to his *Species Muscorum.*

SUBSECT. II. *Mouth of the capsule furnished with a peristome.* PERISTOMI.

DIV. I. *Peristome single.* APLOPERISTOMI.

32. PTEROGÓNIUM. *Sw.* Pterogonium.

Seta lateral. *Peristome* single, of 16 entire, equidistant *teeth. Calyptra* dimidiate. (*Musc. Brit. t.* 2.)—Name; πτερον, a *wing*, and γονος, a *shoot:* signifying winged shoots or branches.

[1] From πλευρα, the *side*, and καρπον, *fruit.*

[2] *Hedwigia Hornschuchiana*, Hooker, Musc. Exot., and Schwaegrichen.

1. P. *Smithii*, Sw. (*curled Pterogonium*); stems much branched, branches pinnate leaves lingulate obtuse entire crisped when dry their margins recurved, the nerve reaching about half-way up, seta very short, lid rostrate. *Sw. in Schrad. Journ. v.* 2. *p.* 173. *Fl. Brit. p.* 1271. *E. Bot. t.* 1326. *Schwaegr. Suppl. v.* 1. *p.* 105, *and v.* 2. *p.* 31. *t.* 109. *Hobs. Br. Mosses, v.* 2. *n.* 25. *Musc. Brit. ed.* 2. *p.* 74. *t.* 14.—*Hypnum Smithii, Dicks. Cr. Fasc.* 2. *p.* 10. *t.* 5. *f.* 4. *Hedw. Sp. Musc. p.* 264. *t.* 68. *f.* 5—7.

Trunks of trees in the south of England. *Fr.* Spring.—*Stems* very much branched, branches pinnated, much curled, as are the *leaves* when dry. The *fruit*, which is not commonly produced, is nearly sessile, the *seta* slightly curved.

2. P. *grácile*, Sw. (*slender Pterogonium*); branches fascicled curved, leaves broadly ovate acute concave their margins plane the summits serrated faintly 2-nerved at the base, lid conical. *Sw. Musc. Suec. p.* 26. *Fl. Brit. p.* 1270. *E. Bot. t.* 1085. *Schwaegr. Suppl. v.* 1. *p.* 105. *Hobs. Br. Mosses, v.* 1. *n.* 26. *Musc. Brit. ed.* 2. *p.* 74. *t.* 14.—*Pterigynandrum gracile, Hedw. St. Cr. v.* 4. *t.* 6.—*Grimmia ornithopodioides, Mohr.—Hypnum gracile, Linn.—Dill. Musc. p.* 41. *f.* 55.

Rocks, in subalpine and hilly countries, frequent. *Fr.* Winter. — A careful examination of good specimens of the *fruit* of this plant will bring to view something like an *inner peristome*, a narrow membrane, similar to that which unites the base of the cilia of *Neckera*, yet terminating so irregularly as not to justify us in placing this among the mosses which have a *double peristome*.

3. P. *filifórme*, Schwaegr. (*filiform Pterogonium*); stems irregularly branched curved, leaves ovate subacuminated concave their margins recurved serrated, nerve single or forked short faint, lid conical. *Schwaegr. Suppl. v.* 1. *p.* 100. *E. Bot. t.* 2297. *Musc. Brit. ed.* 2. *p.* 75. *t.* 14.—*Pterigynandrum filiforme, Hedw. St. Cr. v.* 4. *t.* 7.—*Pterogonium cæspitosum, E. Bot. t.* 2526.—*Hypnum cylindricum, Dicks. Cr. Fasc.* 2. *p.* 12. *Fl. Brit. p.* 1280.

Rocks, upon the mountains of Scotland and Ireland. *Fr.* Summer. — In this and the preceding species, the *leaves* are closely imbricated and subsecund, but the present plant is much the smaller of the two and more irregularly branched. The *cellules* of the *leaves* are larger than in *P. gracile*, and project on the back and at the margins, which give the foliage a papillose appearance, as in *Hypnum catenulatum, H. proliferum*, and a few others.

33. Leúcodon. *Schwaegr.* Leucodon.

Seta lateral. *Peristome* single, of 32 *teeth*, closely united in pairs. *Calyptra* dimidiate. (*Musc. Brit. t.* 2.)—Named from λευκος, *white*, and οδων, a *tooth*, on account of the pale-coloured teeth of the British species, the one on which the Genus was founded.

1. L. *sciuroides*, Schwaegr, (*Squirrel-tail Leucodon*); leaves

closely imbricated ovato-cordate acuminated striated, capsule oblong. *Schwaegr. Suppl. v. 2. p.* 1. *Hobs. Br. Mosses, v.* 1. *n.* 51. *Musc. Brit. ed.* 2. *p.* 112. *t.* 20.—*L. Morensis, Schwaegr. Suppl. v.* 1. *P. II. p.* 2. *and v.* 2. *P. I. t.* 125.—*Dicranum sciuroides, Sw.—Fl. Brit. p.* 1215. *E. Bot. t.* 1903.—*Trichostomum sciuroides, Mohr.—Pterogonium sciuroides, Turn. Musc. Hib. p.* 32.—*Hypnum sciuroides, Linn.—Dill. Musc. t.* 41. *f.* 54.

Frequent on trunks of trees, in England; rare in Scotland. *Fr.* (very scarce) Summer.—*Stems* long, creeping on the bark of trees. *Branches* ascending, often tumid, when it becomes the *L. Morensis* of Schwaegr. *Leaves* concave, those of the *perichætium* long, cylindrical, sheathing, especially the inner ones, which are half as long as the fruitstalk, and which closely envelope it: this latter is about an inch long. *Lid* rostrate. The perfect fruit has rarely been gathered but by *C. Lyell, Esq.* in the New Forest, Hants, and by *Mr. Borrer* in Sussex.

Div. II. *Peristome double.* Diploperistomi.

A. *Internal peristome composed of free cilia, or apparently so.*

34. Neckéra. *Hedw.* Neckera.

Seta lateral. *Peristome* double; the *outer* of 16 *teeth;* the *inner* of 16 free *cilia,* or connected only at the very base by a short membrane. *Calyptra* dimidiate (mitriform in *N. pennata,* according to *Mr. Arnott*). *Musc. Brit. t.* 23.—Named in honour of *N. J. Necker,* who denied, and with much justice, the presence of real *anthers* and *pistils* in mosses.

1. N. *púmila,* Hedw. (*small Neckera*); leaves bifarious ovato-acuminate slightly concave their margins recurved, seta scarcely longer than the perichætial leaves, capsule oblongo-ovate. *Hedw. St. Cr. v.* 3. *t.* 20. *Fl. Brit. p.* 1272. *E. Bot. t.* 1443. *Schwaegr. Suppl. v.* 1. *P. II. p.* 147. *Musc. Brit. ed.* 2. *p.* 135. *t.* 22.—*Hypnum pennatum, Dicks.*

Woods in Sussex, Hants, and probably the South of England generally. Cheshire and N. Wales; S. W. of Ireland, *Wilson.* Abundant at Inverary and at Cleish, but otherwise rare in Scotland. *Fr.* Summer. — The *perichætial leaves* are very convolute, ovate, much acuminated, and the *setæ* are only in a slight degree exserted beyond them.

2. N. *pennáta,* Hedw. (*feathered Neckera*); leaves bifarious ovato-lanceolate acuminate plane, capsule sessile oblong immersed in the perichætial leaves. *Hedw. St. Cr. v.* 3. *t.* 19. *Schwaegr. Suppl. v.* 1. *P. II. p.* 144. *Grev. Scot. Cr. Fl. t.* 109. *Musc. Brit. ed.* 2. *p.* 135. *Suppl. t.* 4.—*Daltonia pennata, Arn. Disp. Musc. p.* 54.—*Fontinalis pennata, Linn. Sp. Pl. p.* 1571. —*Dill. Musc. t.* 32. *f.* 9.

On the trunk of a Beech at Fotheringham, near Forfar, very sparingly in fruit, *Drummond. Fr.* Summer. — Although not uncommon in Switzerland, no station is known for this moss in Britain, but that above given. In size, it is intermediate between the preceding and the following; but is readily distinguished from both by the different form of the *leaves* and immersed *capsule.*

3. N. *crispa*, Hedw. (*crisped Neckera*); leaves bifarious oblong acuminulate transversely waved, seta much exserted, capsule ovate. *Hedw. Sp. Musc. p.* 206. *Turn. Musc. Hib. p.* 101. *Fl. Brit. p.* 1273. *Hobs. Br. Mosses, v.* 2. *n.* 48. *Drum. Musc. Scot. v.* 1. *n.* 61. *Schwaegr. Suppl. v.* 1. *P. II. p.* 147. *Musc. Brit. ed.* 2. *p.* 136. *t.* 22.—*Hypnum crispum, Linn.*—*E. Bot. t.* 617.—*Dill. Musc. t.* 36. *f.* 12.

Trees and rocks, in stony and subalpine countries. *Fr.* Winter.—This most lovely moss invests rocks and portions of the trunks of trees with its richly-coloured and glossy foliage. The *leaves* of this and the preceding ones are, under a magnifying power, slightly serrated. The *seta* is much exserted and the *capsule* is ovate approaching to sphærical.

35. Anómodon. *Hook. and Taylor.* Anomodon.

Seta lateral. *Peristome* double; consisting of 16 *teeth* with a ciliary process arising from each. *Calyptra* dimidiate. (*Musc. Brit. t.* 3.)—Named from α, *not*, νομος, a *law*, and οδων, a *tooth*; from the anomalous nature of the peristome. The same peculiarity is found in some *Orthotricha* and in *Daltonia*. Such mosses cannot be said to have a double peristome in the usual acceptation of the words, *i. e.* one within the other. When similar characters are accompanied by a peculiar habit they may be deemed of sufficient importance to constitute generic distinctions.

1. A. *curtipéndulum*, Hook. and Taylor, (*pendulous Anomodon*); leaves ovate acuminate toothed, the nerve disappearing below the point, seta twice as long as the perichætium, capsule ovate. *Musc. Brit. ed.* 1. *p.* 79. *ed.* 2. *p.* 137. *t.* 22. *Hobs. Brit. Mosses, v.* 2. *n.* 49. *Drum. Musc. Scot. v.* 1. *n.* 62.—*Neckera curtipendula, Hedw. Sp. Musc. p.* 209. *Turn. Musc. Hib. p.* 102. *Fl. Brit. p.* 1275. *E. Bot. t.* 1444. *Schwaegr. Suppl. v.* 1. *P. II. p.* 151. —*Antitrichia curtipendula, Brid.*—*Hypnum curtipendulum, Linn.*—*Dill. Musc. t.* 43. *f.* 69.

Upon rocks and trees, principally in mountainous countries. On sandy plains, near Yarmouth, but always barren. *Fr.* Spring.—This moss is of a peculiarly dark, almost blackish, green, 3, to 8—10 inches long, pinnated with cylindrical branches; the extremities slightly incrassated. *Leaves* imbricated on all sides, concave with a reflexed margin.

2. A. *viticulósum*, Hook. and Taylor, (*cylindrical Anomodon*); leaves ovato-lanceolate obtuse entire the nerve reaching to the point, seta very long, capsule cylindrical. *Musc. Brit. ed.* 1. *p.* 80. *ed.* 2. *p.* 138. *t.* 22. *Hobs. Br. Mosses, v.* 2. *n.* 50. *Drum. Musc. Scot. v.* 1. *n.* 63. *Schwaegr. Suppl. v.* 1. *P. II. p.* 149. —*Neckera vitic. Hedw. Sp. Musc. t.* 48. *f.* 4—8. *Turn. Musc. Hib. p.* 103.—*Hypnum viticulosum, Linn. Sp. Pl. p.* 1592. *Fl. Brit. p.* 1275. *E. Bot. t.* 263.—*Dill. Musc. p.* 39. *f.* 43.

Upon trees and rocks; less frequently on the ground. *Fr.* Feb.—*Leaves* imbricated on all sides of the stem, erect, patent, somewhat waved, of a thick and soft texture and pale green colour, very yellow

when old. *Perichætium* small; *nerve* strong. *Seta* an inch or more long. *Lid* rostrate.

36. Daltónia. *Hook. and Taylor.* Daltonia.

Seta lateral. *Peristome* double; consisting of 16 *teeth*, with a ciliary process arising from the side of each. *Calyptra* mitriform. (*Musc. Brit. t.* 3. *f.* 1—4.)—Named in compliment to the *Rev. James Dalton, F. L. S.* Rector of Croft: a gentleman as much distinguished by his botanical as by his classical acquirements, a lover no less of science than of the fine arts, and one whom the author has been long proud to number among his most valued friends.—This Genus is the same with *Cryphæa* of Web. et Mohr, and Bridel: but there was already a *Cryphia* of Mr. Brown.

1. D. *heteromálla*, Hook. and Taylor, (*lateral Daltonia*). *Musc. Brit. ed.* 1. *p.* 81. *ed.* 2. *p.* 139. *t.* 22. *Hobs. Br. Mosses, v.* 2. *n.* 51. *Drum. Musc. Scot. v.* 1. *n.* 64.—*Neckera heteromalla, Hedw. St. Cr. v.* 3. *t.* 15. *Turn. Musc. Hib. p.* 102. *Fl. Brit. p.* 1274. *E. Bot. t.* 1180. *Schwaegr. Suppl. v.* 1. *P. II. p.* 146. —*Cryphæa heterom. Brid.*—*Fontinalis secunda, Dicks.*—*Sphagnum arboreum, Linn.*—*Dill. Musc. t.* 32. *f.* 6.

Trunks of trees, England, and south of Ireland, plentiful (*Wils.*): rare in Scotland. *Fr.* April.—*Stems* slightly branched, diffuse. *Leaves* imbricated on every side, concave, the *nerve* disappearing below the point, the margins recurved and quite entire. *Perichætial leaves* as long as the sessile oblong-ovate *capsule*, broadly ovate and suddenly acuminated, almost cuspidate, having a nerve reaching to the point. *Lid* conico-acuminate. *Calyptra* mitriform, brown; somewhat fringed at the margin. At the suggestion of Mr. Wilson, who finds the inner peristome of *D. splachnoides* to arise from a membrane as in *Hookeria*, I have referred that species to the latter Genus.

B. *Inner peristome composed of cilia united below into a membrane or connected by transverse bars.*

37. Fontinális. *Linn.* Water-Moss.

Seta lateral. *Peristome* double: the *outer* of 16 *teeth*; the *inner of* 16 *cilia*, connected by transverse bars and forming a reticulated cone. *Calyptra* mitriform. (*Musc. Brit. ed.* 2. *t.* 3.) Named thus from its being an aquatic Genus.

1. F. *antipyrética*, Linn. (*greater Water-Moss*); leaves nerveless broadly ovate complicato-carinate. *Linn. Sp. Pl. p.* 1571. *Turn. Musc. Hib. p.* 190. *Fl. Brit. p.* 1336. *E. Bot. t.* 859. *Hobs. Br. Mosses, v.* 1. *n.* 53. *Drum. Musc. Scot. v.* 2. *n.* 59. *Schwaegr. Suppl. v.* 1. *P. II. p.* 307. *Musc. Brit. ed.* 2. *p.* 141. *t.* 22.—*Dill. Musc. t.* 33. *f.* 1.

Rivers and stagnant waters. *Fr.* June.—*Stems* a foot or more long, fluitant. *Leaves* broadly ovate, trifarious, decidedly complicato-carinate, rarely plane, as in a var. found by *Mr. Harvey*, easily splitting at the keel. *Fruit* principally on the lower part of the stems. *Perichætium*

large; its leaves resembling closely imbricated scales which cover the capsule, and are of a roundish form, concave, nerveless, generally erose at their apices. *Capsule* elliptical. *Lid*, conical, acute.

The specific name was given to this plant by Linnæus, in allusion to the use made of it by the Swedish peasantry, who fill up with it the spaces between the chimney and the walls in their houses, and thus by excluding the air prevent the action of the fire.

2. F. *squamósa*, Linn. (*alpine Water-Moss*); leaves nerveless lanceolate acuminate plane. *Linn. Sp. Pl. p.* 1571. *Hedw. St. Cr. v.* 3. *t.* 12. *Turn. Musc. Hib. p.* 199. *Fl. Brit. p.* 1336. *E. Bot. t.* 1861. *Hobs. Br. Mosses, v.* 2. *n.* 52. *Drum. Musc. Scot. v.* 2. *n.* 60. *Musc. Brit. ed.* 2. *p.* 142. *t.* 22.

Alpine rivulets, abundant. *Fr.* June.—Much smaller than the last, and as I am now satisfied, quite distinct from it in its narrow never complicate *leaves*.

3. F. *capillácea*, Dicks. (*bristly Water-Moss*); leaves furnished with a nerve slightly concave subulate, *Dicks. Cr. Fasc.* 2. *p.* 1. *Fl. Brit. p.* 1337. *E. Bot. t.* 2432. *Schwaegr. Suppl. v.* 1. *P. II. p.* 307. *Musc. Brit. ed.* 2. *p.* 142. *t.* 22.—*Dill. Musc. t.* 33. *f.* 5.

Alpine rivulets, in Scotland, *Mr. Dickson. Fr.* ——?—I am not aware that any one, except Mr. Dickson, has seen this plant growing in Britain; nor do I know in what particular part of Scotland he gathered it. Dillenius' specimens were from Pennsylvania: and beautiful individuals were gathered by Mr. Drummond in North America, during Capt. Franklin's 2d Journey, and published by him in his valuable *Musci Americani, v.* 2. *n.* 234.

38. Hookéria. Sm. *Hookeria.*

Seta lateral. *Peristome* double: the *outer* of 16 teeth; the *inner* of 16 *cilia* united below into a membrane, (which in *H. splachnoides* is exceedingly short). *Calyptra* mitriform. (*Musc. Brit. t.* 3.)—Named by Sir J. E. Smith, in compliment to the author of the present work.

1. H. *lúcens*, Sm. (*shining Hookeria*); leaves bifarious broadly ovate entire obtuse nerveless. *Sm. in Linn. Trans. v.* 9. *p.* 296. *E. Bot. t.* 1902. *Hobs. Br. Mosses, v.* 1. *n.* 63. *Drum. Musc. Scot. v.* 2. *n.* 61. *Musc. Brit. ed.* 2. *p.* 149. *t.* 27.—*Hypnum lucens, Linn.*—*Hedw. Sp. Musc. p.* 243. *Turn. Musc. Hib. p.* 155. *Fl. Brit. p.* 1295.—*Leskea lucens, De Cand.*—*Schwaegr. Suppl. v.* 1. *P. II. p.* 164. *t.* 84.—*Pterigophyllum lucens, Brid.*

Moist banks, in woods and among rocks. *Fr.* Feb.—*Stems* procumbent, 2—4 inches long, slightly branched, plane. *Leaves* arranged on four sides, but bifarious in their direction, quite plane, succulent, pellucid, reticulated, with the meshes large, the margin not thickened; *nerve* none. From the *points* of the leaves, roots are often emitted. *Seta* an inch long, curved at the summit. *Capsule* ovate, horizontal, reticulated, *lid* conico-rostrate. *Calyptra* thin, whitish, faintly reticulated, mitriform, jagged at the base.

2. H. *læte-vírens*, Hook. and Taylor, (*deep green Hookeria*);

leaves bifarious ovate acuminulate margined very obscurely serrated at the extremity with 2-nerves reaching nearly the whole length. *Musc. Brit. ed.* 1. *p.* 89. *ed.* 2. *p.* 150. *t.* 27. *Hook. and Grev. in Edin. Journ. of Sc. v.* 2. *p.* 230. *Schwaegr. Suppl. v.* 2. *P. II. t.* 163.

Duncombe's wood, near Cork, *Mr. J. Drummond;* in dark holes there by the sides of three rivulets which empty themselves into a watering place for horses near the road, *Wils.* O'Sullivan's cascade and Turk waterfall, Killarney, plentiful and in fr., *W. H. Harvey, Esq. Fr.* Nov. Dec. — Much smaller than the last in every part and readily recognised by that circumstance, as well as by the deep green colour of the *leaves*, their smaller reticulations and the 2 long *nerves*.

3. H. *splachnoides*, (*small upright Hookeria*); leaves imbricated on all sides erect oblongo-lanceolate, nerve reaching nearly to the point, calyptra fimbriated at the base. — *Daltonia splachnoides, Musc. Brit. ed.* 1. *p.* 90. *ed.* 2. *p.* 139. *t.* 22.

Secawn mountain, near Dublin (a station since destroyed), *Dr. Taylor*. On moist inclined faces of rocks, usually near rills, on the side of Turk mountain and Cromagloun near Killarney, rarely upon trees, *Mr. Wilson*. *Fr.* Oct. Dec. — The *plant* grows in large tufts: *stems* slightly branched, scarcely half an inch high; *branches* erect; *leaves* rather loosely imbricated, almost erect, of a delicate nearly membranous texture, faintly reticulated, the margins thickened and somewhat waved, entire, those of the *perichætium* are few, small, ovate, nerveless. *Seta* scarcely rising above the stems, scabrous above. *Capsule* inclined, ovate, with an indistinct *apophysis*. *Calyptra* mitriform, nearly white, delicate, faintly reticulated; the base cut into fine capillary segments. *Lid* conico-rostrate, nearly as long as the capsule. *Peristome* large in proportion to the size of the capsule, pale yellow: *outer* one of 16 subulate *teeth* expanding in water, *inner* of 16 slender *cilia* alternating with the outer teeth, united by a membrane which scarcely rises beyond the mouth of the capsule (*Wils.*).

39. Hýpnum. *Linn.* Feather-Moss.

Seta lateral. *Peristome* double: the *outer* of 16 *teeth;* the *inner* of a membrane cut into 16 equal segments, with filiform processes frequently placed between them. *Calyptra* dimidiate. (*Musc. Brit. t.* 3.)—Named from ὑπνος, *sleep*, according to Bridel, given to some kind of tree-moss or Lichen; and by Ray applied to this Genus and its allies on account of some fancied soporiferous property. — *Leskea*, of authors, is here united to *Hypnum:* for the characters by which it is separated (the absence of the intermediate *cilia* or *filiform processes*) is too minute to be generally available to the student.

I. *Stems (taken in conjunction with the leaves) plane.*

1. *Capsules erect.*

1. H. *trichomanoides*, Linn. (*blunt fern-like Feather-Moss*); leaves broadly scymitar-shaped serrated at the point, nerve reaching to the middle of the leaf, capsule ovate erect, lid ros-

trate. *Schreb. Fl. Lips.* — *Turn. Musc. Hib. p.* 145. *Fl. Brit. p.* 1287. *E. Bot. t.* 1493. *Hobs. Br. Mosses, v.* 1. *n.* 64. *Drum. Musc. Scot. v.* 1. *n.* 73. *Musc. Brit. ed.* 2. *p.* 152. *t.* 24. — *Leskea trichom. Hedw.* — *Schwaegr. Suppl. v.* 1. *P. II. p.* 163. — *Dill. Musc. t.* 34. *f.* 8.

Not unfrequent on the trunks of trees. *Fr.* March. — Easily distinguished by its peculiar scymitar-shaped *leaves.*

2. H. *complanátum,* Linn. (*flat Feather-Moss*); leaves oblong apiculate entire nerveless, capsule ovate erect, lid rostrate. *Linn. Sp. Pl. p.* 1588. *Turn. Musc. Hib. p.* 144. *Fl. Brit. p.* 1286. *E. Bot. t.* 1492. *Hobs. Br. Mosses, v.* 1. *n.* 65. *Drum. Musc. Scot. v.* 1. *n.* 72. *Musc. Brit. ed.* 2. *p.* 152. *t.* 24. — *Leskea compl. Hedw.* — *Schwaegr. Suppl. v.* 1. *P. II. p.* 163. — *Dill. Musc. t.* 34. *f.* 7.

Trunks of trees, very common. *Fr.* Spring. — This and the preceding species are allied in habit to *Neckera,* especially to *N. pumila.*

2. *Capsules cernuous or inclined.*

3. H. *ripárium,* Linn. (*short-beaked water Feather-Moss*); leaves ovato-lanceolate acuminated entire the nerve reaching almost to the summit, capsules oblong cernuous, lid conical. *Linn. Sp. Pl. p.* 1595. *Hedw. St. Cr. v.* 4. *t.* 3. *Turn. Musc. Hib. p.* 152. *Fl. Brit. p.* 1292. *E. Bot. t.* 2060. *Hobs. Br. Mosses, v.* 1. *n.* 66. *Schwaegr. Suppl. v.* 1. *P. II. p.* 194. *Musc. Brit. ed.* 2. *p.* 153. *t.* 24. — *Dill. Musc. t.* 40. *f.* 44. *B, C, D.*

Banks of rivers, often partially in the water, and in spots occasionally overflowed. *Fr.* Apr. — *Stems* 4—5 inches long. *Colour* lurid yellow-green. This, like all plants liable to be acted upon by much moisture, is variable in size, in its mode of growth and in the longer or shorter *stems* and *leaves.* Mr. Wilson even doubts if it may not pass into *H. fluitans;* but this opinion I have had no means of verifying.

4. H. *undulátum,* Linn. (*waved Feather-Moss*); leaves ovate acute transversely waved with two faint nerves at the base, capsule oblong furrowed arcuato-cernuous, lid rostrate. *Linn. Sp. Pl. p.* 1589. *Turn. Musc. Hib. p.* 154. *Fl. Brit. p.* 1294. *E. Bot. t.* 1181. *Hobs. Br. Mosses, v.* 1. *n.* 68. *Drum. Musc. Scot. v.* 1. *n.* 75. *Schwaegr. Suppl. v.* 1. *P. II. p.* 197. *Musc. Brit. ed.* 2. *p.* 153. *t.* 24. — *Dill. Musc. t.* 35. *f.* 11.

Woods, in dry heathy places and among rocks. *Fr.* Apr. — This plant has peculiarly white, membranaceous, undulated *leaves,* and the *capsule* distinctly furrowed, which latter peculiarity gives it the same relation with the other *Hypna* as *Bryum palustre* and *B. androgynum* bear to the rest of the *Brya.*

5. H. *denticulátum,* Linn. (*sharp fern-like Feather-Moss*); leaves ovate sometimes approaching to lanceolate more or less acuminate having 2 short nerves at the base, capsule oblongo-cylindraceous inclined, lid conical. *Musc. Brit. ed.* 2. *p.* 153. *t.* 24. — *α. angustifolium;* leaves ovato-lanceolate distant quite plane. *Linn. Sp. Pl. p.* 1558. *Hedw. St. Cr. v.* 4. *t.* 31. *Turn.*

Musc. Hib. p. 148. *t.* 12. *f.* 1. *Fl. Brit. p.* 1288. *E. Bot. t.* 1260. *Hobs. Br. Mosses, v.* 1. *n.* 67. *Drum. Musc. Scot. v.* 1. *n.* 74. *Schwaegr. Suppl. v.* 1. *P. II. p.* 187. *Musc. Brit. ed.* 2. *p.* 153. *t.* 24.—*H. sylvaticum, Schwaegr. Suppl. v.* 1. *P. II. p.* 182. *t.* 82.—*Dill. Musc. t.* 34. *f.* 5.—*β. obtusifolium;* leaves ovate more or less obtuse slightly concave. *H. denticulatum, β. obtusifolium, Turn. Musc. Hib. p.* 146. *t.* 12. *f.* 2.—*H. obtusatum, Wahl. Lapp.*—*H. Donianum, E. Bot. t.* 1446.

Woods and moist rocky places. *β.* Mountains. *Fr.* May.—The above varieties, as I have considered them, some botanists have ranked as species: but if examined in their places of growth intermediate states will be found. The texture of the *leaf* even is variable, more reticulated in *β.* than in *a.*

II. *Stems (taken in conjunction with the leaves) more or less cylindrical, never plane.*

1. *Leaves spreading on all sides (not secund).*

A. *Leaves uniform in their direction (not squarrose).*

a. Nerve reaching to or beyond the point.

* *Leaves without serratures.*

6. H. *médium,* Dicks. (*long-headed Feather-Moss*); leaves ovate obtuse concave entire slightly falcato-secund, the nerve reaching to the summit, capsule cylindrical nearly erect, lid conical. *Dicks. Cr. Fasc.* 2. *p.* 12. *Turn. Musc. Hib. p.* 142. *Fl. Brit. p.* 1280. *E. Bot. t.* 1274. *Hobs. Br. Mosses, v.* 2. *n.* 55. *Musc. Brit. ed.* 2. *p.* 154. *t.* 24.—*H. inundatum, Dicks.*—*Turn. Musc. Hib.*—*Fl. Brit. p.* 1282. *E. Bot. t.* 1022.—*Leskea polycarpa Ehrh. Cr.*—*Hedw.*—*Schwaegr. Suppl. v.* 1. *P. II. p.* 171.

Trunks of trees, particularly of Alders, near the ground. *Fr.* Apr.—Whole plant of a dense growth and lurid colour; *leaves* opaque with the margins recurved, often falcato-secund, so that it has as great a claim to be ranked in the groupe "foliis secundis," as in the present division: and it is in other respects nearly allied to *H. atro-virens.*

7. H. *tenéllum,* Dicks. (*tender awl-leaved Feather-Moss*); leaves fasciculated erect lanceolato-subulate entire, their nerve reaching to the point, capsule ovate cernuous, lid rostrate. *Dicks. Cr. Fasc.* 4. *t.* 11. *f.* 12. *Turn. Musc. Hib. p.* 170. *Fl. Brit. p.* 1308. *E. Bot. t.* 1859. (*figure of the leaf incorrect*). *Drum. Musc. Scot. v.* 2. *n.* 63. *Musc. Brit. ed.* 2. *p.* 155. *t.* 24.—*H. Algerianum, Brid.*—*Schwaegr. Suppl. v.* 2. *p.* 161. *t.* 144.

On rocks, especially such as are calcareous, and on old walls. *Fr.* Winter.—The *leaves* are clustered or fasciculated in a peculiar manner in this species: by this character and by the shape and texture of its *leaves* and by the rostrate *lid*, it may be distinguished from *H. serpens;* and from *H. populeum* by its narrower entire *leaves* and long *operculum.* Mr. Wilson, however, has found a *var.* with serrulated foliage, on moist rocks, Anglesea.

8. H. *sérpens,* Linn. (*creeping white-veiled Feather-Moss*);

leaves ovato-lanceolate rather obtuse patent entire, the nerve reaching to the summit or abbreviated, capsule cylindrical curved cernuous, lid conical. *Linn. Sp. Pl. p.* 1596. *Turn. Musc. Hib. p.* 168. *Fl. Brit. p.* 1306. *E. Bot. t.* 1037. *Hobs. Br. Mosses, v.* 1. *n.* 70. *Drum. Musc. Scot. v.* 1. *n.* 77. *Schwaegr. Suppl. v.* 1. *P. II. p.* 260. *Musc. Brit. ed.* 2. *p.* 156. *t.* 24.— *H. fluviatile, Funck.*— *H. tenue, Schrad.*— *H. contextum and H. spinulosum, Hedw.*— *H. subtile, Dicks.*— *Turn.*— *Sm. in Fl. Brit. and in E. Bot. t.* 2496. (*not Hedw*).— *Dill. Musc. t.* 42. *f.* 64.

Moist banks, trunks of trees, on pales and decayed wood in various situations. *Fr.* May. — I agree with Schwaegrichen in saying, "vix datur exemplum tantæ inconstantiæ nervi in ullo *Hypno;*" for different *leaves* on the same individual have the *nerve* varying much in length, and to me, in the older stems, the nerve, of a dark brown colour, seems to reach quite to the point; but Mr. Wilson observes that it always vanishes below it. In others, the nerve almost totally disappears, and then the plant becomes the *H. subtile* of British authors, not *Leskea subtilis* of Hedw. which has the true fringe of a *Leskea*, and has not, that I am aware, yet been found in Britain. For further remarks on this variable species see the *Muscologia Britannica, ed.* 2.

** *Leaves serrated.*

2. H. *populeum*, Hedw. (*matted Feather-Moss*); leaves erect lanceolate acuminated serrated the margin slightly reflexed, the nerve reaching to the point, capsule ovate subcernuous, lid conical. *Hedw. Sp. Musc. t.* 70. *f.* 1—6. *Hobs. Br. Mosses, v.* 1. *n.* 69. *Drum. Musc. Scot. v.* 1. *n.* 78. *Schwaegr. Suppl. v.* 1. *P. II. p.* 238. *Musc. Brit. ed.* 2. *p.* 157. *t.* 24. — *H. implexum, Swartz.*— *Turn. Musc. Hib. p.* 173. *t.* 16. *Fl. Brit. p.* 1310. *E. Bot. t.* 1584.

On stones in shady situations, less frequently on trees. *Fr.* Nov.

10. H. *reflexum*, Web. (*reflexed Feather-Moss*); leaves cordato-acuminate serrated the margin slightly reflexed, the nerve reaching to the point, capsule ovate cernuous, seta rough, lid conical. *Web. et Mohr. Cr. Germ. p.* 306. *et* 476. *Schwaegr. Suppl. v.* 1. *P. II. p.* 161. *t.* 143.

On Ben Nevis, near the base of the mountain; on Ben Lawers, *Dr. Greville. Fr.*——.—British specimens quite accord with original ones from Starke. In habit, they differ considerably from the last species, being more straggling in the growth, the *leaves* are broader and shorter, especially those of the main stem, which are broadly cordate with a suddenly acuminated point.

b. *Nerve shorter than the leaf, or none.*

* *Leaves entire.*

† *Leaves ovate or elliptical.*

11. H. *molle*, Dicks. (*soft water Feather-Moss*); stems creeping, branches erect, leaves loosely imbricated patent rotundato-ovate rather acute concave entire faintly 2-nerved at the base

or with one short nerve, capsule ovate cernuous, lid conical. *Dicks. Cr. Fasc.* 2. *t.* 5. *f.* 8. *Hedw. Sp. Musc. t.* 70. *f.* 7—10. *Fl. Brit. p.* 1312. *E. Bot. t.* 1992. *Hobs. Br. Mosses, v.* 2. *n.* 56. *Drum. Musc. Scot. v.* 2. *n.* 64. *Schwaegr. Suppl. v.* 1. *P. II. p.* 220. *Musc. Brit. ed.* 2. *p.* 158. *t.* 24. *Grev. Scot. Cr. Fl. t.* 283.

Alpine rivulets, in Scotland : Aber, N. Wales, *Mr. Wilson* (the station since destroyed). *Fr.* June. — *Plant* tufted and the short branches (2—3 inches high) erect, bare of foliage below. *Leaves* of a thin membranaceous texture, generally very dark lurid green, concave, varying in the *nerve* which is either single or double. This, indeed, comes very near to *H. alpestre*, which is, however, more rigid in texture, its *leaves* are more patent and in general the nerve is more evident and longer, the colour is yellower at the extremity of the branches.

12. H. *alpéstre*, Swartz, (*mountain water Feather-Moss*); stems creeping, branches erect, leaves loosely imbricated patent rotundato-ovate obtuse concave entire rather rigid, nerve disappearing beyond the middle or faintly 2-nerved at the base, capsule broadly oblong cernuous, lid conical. *Swartz. Musc. Suec. p.* 102. *t.* 6. *f.* 15. *Hedw. Sp. Musc. t.* 44. *f.* 1—4. *Grev. Scot. Cr. Fl. t.* 282.

Mountain rivulets, Ben Challum, Perthshire, *Dr. Greville. Fr.* ——. —I have followed Dr. Greville, who has so beautifully illustrated this and the preceding species, in keeping this Moss distinct from the preceding ; though Dr. Taylor and myself had expressed a different opinion in the *Musc. Brit.*; and indeed the distinguishing marks are very slight, if they are constant.

13. H. *trifárium*, Web. (*three-ranked Feather-Moss*); leaves compactly and subtrifariously imbricated ovate obtuse entire concave, the nerve disappearing below the middle, capsule oblongo-ovate cernuous, lid conical. *Web. et Mohr, Fl. Suec. t.* 2. *f.* 2. *a, d. ejusd. Fl. Cr. Germ. p.* 319. *Musc. Brit. ed.* 2. *p.* 161. *Suppl. t.* 4. *Grev. Scot. Cr. Fl. t.* 279.—*H. stramineum*, β. *Schwaegr. Suppl. v.* 1. *P. II.*

Very rare. Moist bogs and peat-holes on Ben Challum and Ben Lawers, *Dr. Greville and Hooker.* Craigalleach, in Breadalbane, *J. D. Hooker. Fr.* ——. — This is a very beautiful plant, and assuredly quite distinct from *H. stramineum*, with which Schwaegrichen has united it as a *variety*. It is of a dark lurid colour, with remarkably concave and closely imbricated *leaves*. Our plants exactly accord with those from Norway and Lapland.

14. H. *stramíneum*, Dicks. (*straw-like Feather-Moss*); leaves loosely imbricated erecto-patent oblongo-ovate obtuse entire shining, the nerve reaching half way, capsule oblongo-ovate curved cernuous, lid conical. *Dicks. Cr. Fasc.* 1. *t.* 1. *f.* 9. *Turn. Musc. Hib. p.* 164. *Fl. Brit. p.* 1303. *E. Bot. t.* 2465. *Schwaegr. Suppl. t.* 89. *Hobs. Br. Mosses, v.* 2. *n.* 59. *Drum. Musc. Scot. v.* 1. *n.* 82. *Schwaegr. Suppl. v.* 1. *P. II. p.* 212. (*excl. var.* β.). *Musc. Brit. ed.* 2. *p.* 161. *t.* 24.

Banks and wet bogs, frequently mixed with other mosses. Abundant

on the Breadalbane mountains; very rare in *fr.*: on moist sandy places near Dundee (*Mr. Drummond*); and Castle Kelly Glen, Ireland, *Dr. Taylor*. In fruit near Berwick-upon-Tweed, *Dr. Johnston*. *Fr.* ——. — The slender habit, pale colour and obtuse *leaves* are striking characters in this species. It seems to bear fruit almost entirely in sandy places, where the *seta* is half buried in the soil.

15. H. *flavéscens*, (*pale yellow Feather-Moss*); stems depressed and procumbent thickly matted, leaves ovato-lanceolate acuminate entire concave with flattened margins, faintly 2-nerved at the base erecto-patent and slightly secund, seta smooth, capsule ovate cernuous, lid with a long slender beak. *Wils. MSS.*

On moist shady rocks, by rills in mountainous woods; near Killarney, frequent, also near Glengariff, *Mr. Wilson*. *Fr.* June, July. — "This has no obvious affinity in habit to any other British species. It often grows in broad patches or flakes on the inclined faces of rocks, over which water occasionally flows." *Wils.*

16. H. *murále*, Hedw. (*wall Feather-Moss*); leaves nearly erect imbricated oval with a very short point concave the single nerve reaching three-fourths of the way up, capsule ovate cernuous, lid rostrate. *Hedw. St. Cr. v.* 4. *t.* 30. *Turn. Musc. Hib. p.* 166. *Fl. Brit. p.* 1304. *Hobs. Br. Mosses, v.* 1. *n.* 72. *Schwaegr. Suppl. v.* 1. *P. II. p.* 198. *Musc. Brit. ed.* 2. *p.* 161. *t.* 24. — *H. confertum*, *E. Bot. t.* 1038. — *H. abbreviatum*, *Hedw. Sp. Musc. t.* 65. *f.* 1—4. — *Dill. Musc. t.* 41. *f.* 52.

On walls and stones. *Fr.* Oct. Nov.—The rostrate *lid* and concave short-pointed *leaves* distinguish this species from its affinities.

17. H. *púrum*, Linn. (*neat meadow Feather-Moss*); leaves closely imbricated oval with a very short point very concave, the nerve reaching half way up, capsule ovate cernuous, lid conical. *Linn. Sp. Pl. p.* 1594. *Hedw. Sp. Musc. t.* 66. *f.* 3—6. *Turn. Musc. Hib. p.* 175. *Fl. Brit. p.* 1313. *E. Bot. t.* 1599. *Hobs. Br. Mosses, v.* 1. *n.* 74. *Drum. Musc. Scot. v.* 1. *n.* 83. *Schwaegr. Suppl. v.* 1. *P. II. p.* 126. *Musc. Brit. ed.* 2. *p.* 162. *t.* 24. — *H. illecebrum*, *Fl. Brit. and E. Bot. p.* 2189. (*not Hedw.*) *Dill. Musc. t.* 40. *f.* 45.

On the ground, on banks and in woods, abundant. *Fr.* Nov. — Dillenius informs us that the specific name of this very common moss is derived from the use, made of it in some parts of England, in cleansing worms for Fishermen.

18. H. *piliferum*, Schreb. (*hair-pointed Feather-Moss*); leaves ovate with a long narrow acumen scarcely serrated, the nerve disappearing below the middle, capsule cernuous, lid rostrate. *Schreb. Fl. Lips. p.* 91. *Hedw. St. Cr. v.* 4. *t.* 14. *Turn. Musc. Hib. p.* 178. *Fl. Brit. p.* 1319. *E. Bot. t.* 1516. *Drum. Musc. Scot. v.* 2. *n.* 71. *Schwaegr. Suppl. v.* 1. *P. II. p.* 239. *Musc. Brit. ed.* 2. *p.* 175. *t.* 25.

Banks, rare in *fr.*: found in that state at Auchindenny, near Edinburgh, *Mr. Arnott*; and Cotteral wood, Cheshire, *Mr. Wilson*. *Fr.* Nov. — A distinctly marked plant, which at the suggestion of Mr. Wilson I have removed from the division with serrated leaves, where it has no affinity, and placed along with *H. murale* and *purum*. The *leaves* of the

stem are exactly ovate and so suddenly acuminated into a long narrow point, as to appear, especially when dry, to be hair-pointed. Those of the branches are more gradually attenuated and scarcely warrant the specific name.

19. H. *Schrebéri*, Willd. (*Schreberian Feather-Moss*); leaves closely imbricated nearly erect elliptical apiculate concave entire faintly 2-nerved at the base, capsule ovate cernuous, lid conical. *Willd. Fl. Berol. p.* 325. *Turn. Musc. Hib. p.* 176. *Fl. Brit.* 1315. *E. Bot. t.* 1621. *Hobs. Br. Mosses, v.* 1. *n.* 71. *Drum. Musc. Scot. v.* 1. *n.* 81. *Schwaegr. Suppl. v.* 1. *P. II. p.* 227. *Musc. Brit. ed.* 2. *p.* 159. *t.* 24.—*H. muticum, Sw.*—*Dill. Musc. t.* 40. *f.* 7.

Woods and banks, among bushes, frequent. *Fr.* Oct.—Allied to *H. purum;* but slenderer, more rigid and more compressed in the *stems* and branches, which are of a red colour, best seen by holding the plant between the eye and the light.

20. H. *monilifórme*, Wahl. (*beaded Feather-Moss*); leaves closely imbricated rotundato-ovate obtuse very concave ventricose nerveless, capsule ovate nearly erect. *Wahl. Lapp. p.* 376. *t.* 24. *Hobs. Br. Mosses, v.* 2. *n.* 57. *Musc. Brit. ed.* 2. *p.* 159. *t.* 24.—*Leskea julacea, Mohr.*—*Hypnum julaceum, Schwaegr. Suppl. v.* 1. *P. II. p.* 216. *t.* 89.—*Pterogonium? rotundifolium, E. Bot. t.* 2525.

On the ground, Cunnamara mountains, Ireland, *Mr. J. T. Mackay.* Not uncommon on rocks in the Breadalbane mountains. *Fr.*——.

21. H. *catenulátum*, Schwaegr. (*catenulated Feather-Moss*); leaves subpatent ovate subacuminate papillose on the back and margin with a very short nerve, capsule ovate inclined, lid conical acuminate. *Schwaegr. Suppl. v.* 1. *P. II. p.* 218. *Hobs. Br. Mosses, v.* 2. *n.* 58. *Musc. Brit. ed.* 2. *p.* 160. *t.* 24.—*H. Conferva, Schwaegr. Suppl. v.* 2. *P. II. p.* 158. *t.* 142.—*Grimmia catenulata, Mohr.*—*Pterigynandrum, Brid.*

Wet rocks and in woods. Dargle and Powerscourt, near Dublin, *Dr. Taylor.* Ben Lawers, *Dr. Greville.* Campsie hills, near Glasgow, *Mr. Arnott.* Mill Dingle, near Beaumaris, and woods near Bangor, but always barren, *Wilson.* *Fr.*——?—This has probably not unfrequently been taken for *Pterogonium filiforme*, and Mr. Mackay's specimens in *E. Bot.* under the last-mentioned name, are *H. catenulatum.* The present plant is a genuine *Hypnum*, having a single filiform process between the segments of its *inner peristome.* The *stems* are closely tufted, from one to two inches in length, rigid. *Leaves* rather remote, of a dark green colour, their margins appearing as it were serrated from the papillæ on the surface. In our specimens, the *nerve* is short, not more than one fourth of the length of the leaf, whilst in *H. catenulatum* of Schwaegr. it is said to disappear beyond the middle.

†† *Leaves lanceolate or subulate.*

+ *Leaves without striæ.*

22. H. *plumósum*, Linn. (*rusty Feather-Moss*); leaves erecto-patent the upper ones sometimes secund all of them ovato-lanceo-

late acuminate subserrated the margins recurved, the nerve reaching above the middle, capsule ovate cernuous, lid conical. *Linn. Sp. Pl. p.* 1592. (*not Hedw.*) *Turn. Musc. Hib. p.* 172. *t.* 15. *f.* 1. *Fl. Brit. p.* 1310. *E. Bot. t.* 2071. *Hobs. Br. Mosses, v.* 1. *n.* 73. *Drum. Musc. Scot. v.* 2. *n.* 65. *Schwaegr. Suppl. v.* 1. *P. II. p.* 244. *Musc. Brit. ed.* 2. *p.* 162. *t.* 25.—*H. alpinum, Turn. Musc. Hib. p.* 192. *Fl. Brit. p.* 1380. *E. Bot. t.* 1406.—*H. flagellare, Hedw. Sp. Musc. t.* 73. *f.* 1—3. (*not Dicks.*).

Moist banks and rocks, not uncommon. *Fr.* Oct.—The *upper leaves* are often secund, all of them of a glossy, generally deep, yellow-green. The plant varies much in size. Hedwig's *H. plumosum* (our *H. salebrosum*) has striated *leaves* and ranks near *H. lutescens.*

23. H. *demíssum*, 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 Cromagloun 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."

24. H. *pulchéllum*, Dicks. (*elegant Feather-Moss*); leaves loosely imbricated the upper ones subsecund all of them lanceolato-acuminate entire nerveless, capsule ovato-cylindrical nearly erect, lid conical. *Dicks. Cr. Fasc.* 2. *t.* 5. *f.* 6. *Turn. Musc. Hib. p.* 136. *Fl. Brit. p.* 1277. *E. Bot. t.* 2006. *Drum. Musc. Scot. v.* 1. *n.* 76. *Musc. Brit. ed.* 2. *p.* 163. *t.* 25.—*Leskea pulchella, Hedw. Sp. Musc. t.* 55. *f.* 7—12.—*Hypnum nitidulum, Wahl.*

Woods, in alpine countries and among rocks. *Fr.* Sept. — A small species, scarcely an inch in length; the *leaves* spreading out nearly horizontally on two opposite sides of the stem, whence Wahlenberg has referred it to his division "*shoots plane;*" but its upper *leaves* are subsecund, and it approaches in many respects the *H. Silesianum.*

+ + *Leaves striated.*

25 H. *ruféscens*, Dicks. (*red mountain Feather-Moss*); leaves erecto-patent lanceolate acuminate entire striated faintly two-nerved at the base, capsule ovate nearly erect, lid conical. *Dicks. Cr. Fasc.* 3. *t.* 8. *f.* 4. *Fl. Brit. p.* 1316. *E. Bot. t.* 2296. *Hobs. Br. Mosses, v.* 2. *n.* 61. *Drum. Musc. Scot. v.* 2. *n.* 66. *Musc. Brit. ed.* 2. *p.* 164. *t.* 25.—*Leskea rufescens, Schwaegr. Suppl. v.* 1. *P. II. p.* 178. *t.* 88.

Scottish mountains, among moist rocks, not unfrequent. *Fr.* rare, July.—In this state the *Rev. Colin Smith* finds it abundantly near Inverary: and *Mr. Wilson* at the upper end of Finlarig Burn, Perthshire. —Whole plant of a singularly yellowish-purple colour; *stems* erect. It varies in size, and small decumbent specimens considerably resemble the *Hyypum incurvatum* of authors.

26. H. *polyánthos*, (*many-fruited Feather-Moss*); leaves erecto-patent ovato-lanceolate remarkably acuminate minutely serrated at the point smooth obscurely 2-nerved at the base, capsule ovato-cylindrical erect, lid conico-acuminate. *Hook. in Drum. Musc. Scot. v.* 2. *n.* 87. *Musc. Brit. ed.* 2. *p.* 164. *Suppl. t.* 5. (*not E. Bot.*).—*Leskea polyanthia, Hedw. St. Cr. v.* 4. *t.* 2. *Schwaegr. Suppl. v.* 1. *P. II. p.* 69.

Trees and rocks, perhaps not rare: first found in England on Apple trees, near Darlington, by *Mr. W. Backhouse;* and on rocks and trees about Forfar, Scotland, by *Mr. Drummond. Fr.* ——.—*Stems* forming densely entangled tufts, with numerous short erect *branches. Leaves* erecto-patent, slightly secund on the lowermost creeping shoots, ovato-lanceolate, running out into a long narrow acumen, which appears under a magnifier slightly serrated; there are 2 very short indistinct *nerves* at the base. *Seta* about half an inch long. *Capsule* cylindrical, slightly swelling at the base, reddish-brown. A small *var.* of *H. cupressiforme*, not unfrequent upon trees, has often been taken for this plant, and is indeed figured as such in *E. Bot. t.* 1664. Our plant is known by the *leaves* pointing in all directions, broader below, more suddenly acuminated above, the *capsule* quite erect, and by having decidedly the *peristome* of a *Leskea.*

27. H. *seríceum*, Linn. (*silky Feather-Moss*); leaves erecto-patent lanceolate acuminate entire or slightly serrated, the nerve reaching to 3-4ths of the length, capsule ovato-cylindrical, seta rough, lid conical. *Linn. Sp. Pl. p.* 1595. *Turn. Musc. Hib. p.* 138. *Fl. Brit. p.* 1282. *E. Bot. t.* 1445. *Hobs. Br. Mosses, v.* 1. *n.* 79. *Drum. Musc. Scot. v.* 1. *n.* 79. *Musc. Brit. ed.* 2. *p.* 165. *t.* 25.—*Leskea sericea, Hedw. St. Cr. v.* 4. *t.* 17. *Schwaegr. Suppl. v.* 1. *P. II. p.* 178.—*Dill. Musc. t.* 42. *f.* 9.

On trunks of trees, walls and rocks. *Fr.* Nov.— *Calyptra*, when young, hairy. "*Seta* rough. I am satisfied that this is a true *Hypnum* (not a *Leskea*), but the *inner peristome* is always defectively formed, perhaps owing to its adhesion to the *columella* and its rupture by the shrinking of the latter." *Wils.*

28. H. *salebrósum*, Hoffm. (*smooth-stalked yellow Feather-Moss*); leaves erecto-patent lanceolate acuminated into a waved hair-like scarcely serrulate point striated, the nerve disappearing above the middle, capsule ovate cernuous, seta smooth, lid conico-acuminate. *Hoffm. Fl. Germ. v.* 2. *p.* 74. *Schwaegr. Suppl. v.* 1. *P. II. p.* 237. *Drum. Musc. Scot. v.* 2. *n.* 68. *Grev. Scot. Cr. Fl. t.* 184. *Musc. Brit. ed.* 2. *p.* 166. *Suppl. t.* 5.—*H. plumosum, Hedw. St. Cr. v.* 4. *t.* 15. (*excl. syn.*).

Cotteral wood, near Manchester, *Mr. Hobson.* Near the Loch of Forfar, Scotland, *Mr. Drummond. Fr.* Nov.—Closely allied to *H. lutescens* and *H. plumosum.* It is remarkable for its pale green colour and thin flaccid *leaves*, which are generally more patent and taper into a more hair-like and waved *point* than any of its affinities.

29. H. *lutéscens*, Huds. (*rough-stalked yellow Feather-Moss*); leaves erecto-patent lanceolate acuminate entire striated, the

nerve disappearing below the point, capsule ovate cernuous, seta rough, lid shortly rostrate. *Huds. Angl. ed.* 1. *p.* 421. *Hedw. St. Cr. v.* 4. *t.* 16. *Turn. Musc. Hib. p.* 174. *Fl. Brit. p.* 1311. *E. Bot. t.* 1301. *Hobs. Br. Mosses, v.* 2. *n.* 62. *Drum. Musc. Scot. v.* 1. *n.* 80. *Schwaegr. Suppl. v.* 1. *P. II. p.* 237. *Musc. Brit. ed.* 2. *p.* 166. *t.* 25. — *Dill. Musc. t.* 48. *f.* 60.

On banks, on the stems of trees and bushes near the ground, frequent. *Fr.* Spring. — *Leaves* of a bright yellow-green colour, sometimes slightly serrulate. *Lid* rostrate, not conical as in *H. salebrosum*.

30. H. *nítens*, Schreb. (*shining Feather-Moss*); leaves erecto-patent lanceolato-subulate acuminate nearly entire striated, the nerve running almost to the point, capsule oblongo-ovate curved cernuous, seta smooth, lid conical. *Schreb. Fl. Lips. p.* 92. *Fl. Brit. p.* 1316. *E. Bot. t.* 1646. *Drum. Musc. Scot. v.* 2. *n.* 67. *Hobs. Br. Mosses, v.* 2. *n.* 63. *Schwaegr. Suppl. v.* 1. *P. II. p.* 291. *Musc. Brit. ed.* 2. *p.* 167. *t.* 25. — *Dill. Musc. t.* 39. *f.* 37.

Bogs and marshy ground, in the East of England and of Scotland. *Fr.* ——. — This fine and brightly coloured moss seems to be peculiar to the East of England and Scotland. The *Rev. James Dalton* finds it in *fr.* between Copgrove and the river Ure, Yorkshire.

31. H. *álbicans*, Neck. (*whitish Feather-Moss*); leaves erect ovato-lanceolate acuminate faintly striated concave entire revolute at the margin, the nerve reaching half way, capsules ovate cernuous, seta smooth, lid conical. *Neck. Meth. Musc. p.* 180. *Hedw. St. Cr. v.* 4. *t.* 5. *Turn. Musc. Hib. p.* 171. *Fl. Brit. p.* 1309. *E. Bot. t.* 1300. *Hobs. Br. Mosses, v.* 2. *n.* 62. *Drum. Musc. Scot. v.* 2. *n.* 69. *Musc. Brit. ed.* 2. *p.* 167. *t.* 25. — *Dill. Musc. t.* 42. *f.* 63.

Hedge-banks, and on the ground, in sandy soils, frequent. *Fr.* Nov. — This is of a pale colour, and is less branched than *H. lutescens*, which it resembles in many points. Its *leaves*, however, are longer, more acuminate, softer and more patent. — The last 5 species have a very close natural affinity, one with another.

** *Leaves serrated.*

† *Stems below bare of leaves. (Tree-like.)*

32. H. *alopecúrum*, Linn. (*fox-tail Feather-Moss*); stems erect simple and naked below fascicled above, leaves concave narrow ovate acute serrated reflexed at the margin, the nerve reaching nearly to the point, capsule ovate cernuous, lid rostrate. *Linn. Sp. Pl. p.* 1594. *Turn. Musc. Hib. p.* 163. *E. Bot. t.* 1182. *Schwaegr. Suppl. v.* 1. *P. II. p.* 265. *Hobs. Br. Mosses, v.* 1. *n.* 77. *Drum. Musc. Scot. v.* 1. *n.* 86. *Musc. Brit. ed.* 2. *p.* 168. *t.* 25.

Woods and shady banks, common. *Fr.* Oct. — This and the following species are among the largest and handsomest of our *Hypna*, and in their upright and tree-like mode of growth differ remarkably from the rest. A *variety*, however, of the present, growing in running water, is

branched from its very base, having the *branches* elongated and the *leaves* more closely set and shorter.

33. H. *dendroides*, Linn. (*tree-like Feather-Moss*); stems erect below simple and naked fascicled above, leaves ovate often more or less lanceolate serrated at the point, the nerve reaching nearly to the summit, capsule ovato-cylindrical, lid rostrate. *Linn. Sp. Pl. p.* 1593. *Turn. Musc. Hib. p.* 138. *Fl. Brit. p.* 1283. *E. Bot. t.* 1565. *Hobs. Br. Mosses, v.* 1. *n.* 78. *Drum. Musc. Scot. v.* 1. *n.* 85. *Musc. Brit. ed.* 2. *p.* 168. *t.* 25.—*Leskea dendr. Hedw.*—*Neckara dendr. Sw.*—*Climacium dendr. Mohr.*—*Schwaegr. Suppl. v.* 1. *P. II. p.* 141. *t.* 81.—*Dill. Musc. t.* 40. *f.* 48.

In woods, and borders of bogs and marshes. *Fr.* Nov. — Mostly in subalpine countries. — The segments of the *inner peristome* being cleft at the base, Weber and Mohr have considered this difference sufficient to constitute a new Genus, *Climacium*. "The *columella* is protruded, and reaches the top of the *lid*, which, when the *capsules* are ripe, and during a dry state of the atmosphere, it raises up, turning in a spiral manner; and thus perhaps, permitting the discharge of the seeds. If, in this state, moisture be applied to the mouth of the *capsule*, the *lid* on the top of the *columella* will descend, as this last performs a spiral volution, and the *capsule* is completely closed again." (*Musc. Brit. ed.* 2. *p.* 169.) *Mr. Wilson* remarks on this, "the *columella* does not appear to twist at all. It is perfectly straight and tapering, and when dry has straight furrows: the *lid* seems to close in consequence of the swelling of the *columella*, which diminishes its length." These different appearances may have depended upon the different ages or states of the plant under examination.

†† *Stems leafy below.*

+ *Capsules erect.*

34. H. *curvátum*, Swartz, (*curved Feather-Moss*); branches fascicled curved, leaves ovato-elliptical concave serrated at the point, the nerve disappearing beyond the middle, capsule ovate erect, lid rostrate. *Sw. Musc. Suec. p.* 64. *Turn. Musc. Hib. p.* 139. *Fl. Brit. p.* 1284. *E. Bot. t.* 1566. *Hobs. Br. Mosses, v.* 1. *n.* 75. *Drum. Musc. Scot. v.* 1. *n.* 87. *Schwaegr. Suppl. v.* 1. *P. II. p.* 267.—*H. myosuroides, Hedw. St. Cr. v.* 4. *t.* 8.—*Dill. Musc. t.* 41. *f.* 50.

On trees and rocks. *Fr.* Nov. — This has something of the habit of the two last species; but its *stems* are leafy throughout; the *nerve* of the *leaf* is sometimes forked. Mr. Wilson finds, in Cheshire and near Killarney, a state of this plant in which the *outer peristome* is abortive, but the rudiments of *teeth* are visible.

35. H. *myosuroides*, Linn. (*mouse-tail Feather-Moss*); branches fascicled curved, leaves lanceolato-acuminate serrated the margin inflexed at the base, the nerve disappearing near the middle, capsule ovato-cylindrical erect, lid rostrate. *Linn. Sp. Pl. p.* 1596. (*not Hedw.*). *Turn. Musc. Hib. p.* 140. *Fl. Brit. p.* 1285. *E. Bot. t.* 1567. *Hobs. Br. Mosses, v.* 1. *n.* 76.

Drum. Musc. Scot. v. 1. *n.* 88. *Schwaegr. Suppl. v.* 1. *P. II. p.* 267. *Musc. Brit. ed.* 2. *p.* 170. *t.* 25.—*Dill. Musc. t.* 41. *f.* 51.

Trunks of trees and rocks. *Fr.* Autumn.—Distinguishable from the preceding by its slenderer habit, its more acuminated, less concave *leaves*, with their shorter *nerve*, and reflexed margins, which are serrated for nearly their whole length. Mr. Wilson finds a large *var.* of this, on Conner Hill near Brandon mountain, Ireland.

⊢⊢ *Capsules cernuous.*

§ *Stems bi-tripinnate.*

36. H. *splendens*, Hedw. (*glittering Feather-Moss*); stems tripinnate, leaves ovate with a suddenly acuminated point concave faintly two-nerved at the base the margin recurved below, capsule ovate cernuous, lid rostrate. *Hedw. Sp. Musc. t.* 67. *f.* 7—9. *Turn. Musc. Hib. p.* 156. *Fl. Brit. p.* 1295. *E. Bot. t.* 1424. *Hobs. Br. Mosses, v.* 1. *n.* 80. *Drum. Musc. Scot. v.* 1. *n.* 90. *Schwaegr. Suppl. v.* 1. *P. II. p.* 237. *Musc. Brit. ed.* 2. *p.* 170. *t.* 25.—*H. parietinum, Sw.*—*Dill. Musc. t.* 35. *f.* 13.

Heaths and hedge-banks in woods. *Fr.* Apr.—The whole *plant* is glossy, whence its specific name.

37. H. *proliferum*, Linn. (*proliferous Feather-Moss*); stems tripinnate, leaves serrated papillose on the back the cauline ones cordato-acuminate striated with a nerve running nearly to the point, those of the branches more ovate with a single or double nerve at the base, lid conico-rostrate. *Linn. Sp. Pl. p.* 1590. *Turn. Musc. Hib. p.* 157. *Fl. Brit. p.* 1297. *E. Bot. t.* 1494. *Hobs. Br. Mosses, v.* 1. *n.* 81. *Drum. Musc. Scot. v.* 1. *n.* 91. *Musc. Brit. ed.* 2. *p.* 170. *t.* 25—*H. tamariscinum, Hedw. Sp. Musc. p.* 261. *t.* 67. *f.* 1—5. *Schwaegr. Suppl. v.* 1. *P. II. p.* 236.—*H. recognitum, Hedw. St. Cr. v.* 4. *t.* 35. *Fl. Brit. p.* 1298. *E. Bot. t.* 1495.—*H. delicatulum, Hedw. St. Cr. v.* 4. *t.* 33. *Schwaegr. Suppl. v.* 1. *P. II. p.* 236.—*Dill. Musc. t.* 35. *f.* 14. *and t.* 83. *f.* 6.

Woods, and banks in heathy places, abundant. *Fr.* Apr.—*Stems* reddish; *leaves* yellowish-green, opaque.—It is an inhabitant of almost every part of the world.

38. H. *prælongum*, Linn. (*very long Feather-Moss*); stems subbipinnate, leaves distantly placed patent cordate or ovate acuminate serrated, the nerve disappearing below the summit, capsule ovate cernuous, lid rostrate. *Linn. Sp. Pl. p.* 1591. *Hedw. St. Cr. v.* 4. *t.* 29. *Turn. Musc. Hib. p.* 160. *Fl. Brit. p.* 1299. *E. Bot. t.* 2035. *Hobs. Br. Mosses, v.* 1. *n.* 82. *Drum. Musc. Scot. v.* 1. *n.* 89. *Schwaegr. Suppl. v.* 1. *P. II. p.* 277. *Musc. Brit. ed.* 2. *p.* 172. *t.* 25.—*H. Stokesii, Turn. Musc. Hib. p.* 159. *t.* 15. *f.* 2. *Fl. Brit. p.* 1300. *E. Bot. t.* 2036.—*H. Swartzii, Turn. Musc. Hib. p.* 151. *t.* 14. *f.* 1, 2. *Fl. Brit. p.* 1293. *E. Bot. t.* 2034.—*H. atrovirens, Sw.*—*Dill. Musc. t.* 36. *f.* 15.

Moist shady banks and on trunks of trees, especially such as are in a state of decay. *Fr.* Nov. — A variable plant, certainly. In mountainous wet situations, the *var.* named *Stokesii* occurs, with closely set bipinnate *branches;* and in wet hollows, the state called *Swartzii*, which is well represented in the magnified figure of *Turn. Musc. Hib. t.* 14. *f.* 2. *b.* and which, as Mr. Wilson observes, is chiefly to be distinguished by its shorter *capsule* and darker colour.

§§ *Stems pinnate or irregularly branched.*

39. H. *flagellâre*, Dicks. (*flagellate Feather-Moss*); stems pinnate (or irregularly bipinnate), leaves thickly set cordato-acuminate serrated very faintly 2-nerved at the base, capsule ovato-oblong cernuous, lid conical. *Dicks. Cr. Fasc.* 2. *p.* 12. *Fl. Brit. p.* 1322. (*not Hedw.*). *Hobs. Br. Mosses, v.* 2. *n.* 65. *Musc. Brit. ed.* 2. *p.* 174. *t.* 25. — *H. umbratum, E. Bot. t.* 2565. *Turn. Musc. Hib. p.* 158. (*not Hedw.*).

Rocks in alpine countries; frequent in the West of Scotland and in Ireland, rare in *fr.*: found in that state by *Mr. Wilson* below Aber water-fall, N. Wales, and far more abundantly in Ireland.

40. H. *micans*, (*sparkling Feather-Moss*); leaves patent roundish-ovate slightly acuminate concave serrated above, the margin flattened below or reflexed two-nerved at the base. *Wils. MSS.*

South of Ireland, *Miss Hutchins, Dr. Taylor.* Frequent near Killarney, Ireland, in the same situations as *H. flavescens:* always barren. "In habit similar to *H. flavescens*, having, like it, the *leaves* slightly secund and of a shining yellow aspect, (the *stems* ranged parallel to each other and but slightly branched), yet a very distinct moss. — It had not wholly escaped the notice of Dr. Taylor, in whose collection I afterwards saw it, not named, and placed with *H. cupressiforme.* Its affinity is, however, rather with *H. flagellare;* a species sometimes found with secund *leaves.*" *Wils.* This moss has been long known to me, as well as to Dr. Taylor; and I had likewise considered it a state of *H. cupressiforme.*

41. H. *abiétinum*, Linn. (*Spruce-tree Feather-Moss*); stems pinnate, leaves papillose on the back and on the slightly reflexed margins the nerve running nearly to the point, those of the stem ovato-acuminate striated those of the branches ovato-lanceolate, capsules cylindrical inclined, lid conical. *Linn. Sp. Pl. p.* 1591. *Hedw. St. Cr. v.* 4. *t.* 32. *Turn. Musc. Hib. p.* 162. *Fl. Brit. p.* 1300. *E. Bot. t.* 2037. *Drum. Musc. Scot. v.* 2. *p.* 70. *Schwaegr. Suppl. v.* 1. *P. II. p.* 232. *Musc. Brit. ed.* 2. *p.* 174. *t.* 25. — *Dill. Musc. t.* 35. *f.* 17.

On the ground, in mountainous and principally calcareous soils. Rare in Scotland. Sands of Barrie, near Dundee, *Mr. Drummond. Fr.* unknown in Britain. — "All the *leaves* are striated and have the margins slightly reflexed, and all are falcato-secund and appressed when dry, erecto-patent when wet, the points of the *leaves* directed in an angle from the stem or branch and not parallel with it; hence, though they are closely crowded together, the outline has not that smooth unbroken appearance, so remarkable in *H. laricinum.*" *Wils.*

It was observed in the *Muscologia Britannica*, that Dr. Swartz's

specimens found in Sweden "are very different from our British ones, having a remarkable furrow in the leaf as seen from above, and consequently a projecting keel beneath:" this plant Mr. Wilson has had the good fortune to discover in England, and has ascertained that it is quite distinct from *H. abietinum:* and to it he gives the following name and character.

42. H. *Blandóvii*, Weber et Mohr, (*Blandow's Feather-Moss*); stems pinnate, leaves serrated smooth on the back with a very prominent keel the margins reflexed, those of the stem cordato-acute with a short nerve, those of the branches ovato-acuminate with the nerve disappearing beyond the middle, capsule cylindrical inclined, lid conical. *Web. et Mohr, Fl. Cr. Germ. p.* 332. *Schwaegr. Suppl. v.* 3. *p.* 158. *t.* 142. *Musc. Brit. ed.* 2. *p.* 175. *t.* 25.

Rocks in subalpine countries. Tonbridge, *Mr. Joseph Woods:* always barren.

43. H. *blándum*, (*neat Feather-Moss*); stems somewhat pinnate, leaves closely imbricated nearly erect ovate very concave almost keeled above apiculate smooth the margins plane serrulated, the nerve disappearing below the point, seta rough, lid conico-acuminate. *Lyell in Hook. Fl. Lond. with a fig.— Musc. Brit. ed.* 2. *p.* 176. *Suppl. t.* 5.

On a bank in Cadnam Lane, New Forest, Hants, *C. Lyell, Esq.* Abundant on elevated rocky ground about Aberffraw, Anglesea, and on banks by road-sides, also sparingly near Bangor, *Mr. Wilson. Fr.* Nov.— Allied on the one hand to *H. murale* and on the other to *H. rutabulum:* but differing by the characters above given.— Mr. Wilson justly observes that the figure of the *leaf* in *Musc. Brit.* does "not properly illustrate the apiculus nor the very concave boat-shaped extremity, characters which are as constant as any other."

44. H. *crassinérvium*, (*thick-nerved Feather-Moss*); "stem creeping, with simple fasciculated erect branches, leaves spreading ovate acuminate concave with reflexed serrated margins nerved more than half way, capsule narrow-ovate, fruit-stalk rough, lid rostrate." *Wils. in E. Bot. Suppl. t.* 2706.— *Taylor MSS.*

South of Ireland, *Dr. Taylor.* Plentiful and in *fr.* (Oct.) at Mucruss near Killarney (on limestone rocks and in shady situations) and at Kenmore; woods near Dublin (barren): in *fr.* near Beaumaris, Anglesea, and plentiful at Tyfry in the same county (barren), also near Bangor and above Aber in Caernarvonshire:—perhaps of frequent occurrence in limestone districts and subalpine countries, *Wilson.* Limestone rocks, Cave hill, Belfast (barren), *Mr. Drummond.*— This, again, according to the observations of Mr. Wilson, who has seen it growing most abundantly, is on the one hand allied to *H. blandum*, and on the other to *H. rutabulum;* but perfectly distinct from both. "When the stems are moist, even barren specimens are known at a glance: the reflexed or flattened *margins* of the *leaves*, contrasted with the general convexity of the disk, are best seen by holding the specimen with the points of the leaves turned away from the light, towards the eye."

45. H. *rutábulum*, Linn. (*common rough-stalked Feather Moss*); stems variously branched, leaves patent ovate acuminate ser-

rated at the points striated, the nerve reaching half way, capsule ovate cernuous, seta rough, lid conical. *Linn. Sp. Pl. p.* 1590. *Hedw. St. Cr. v.* 4. *t.* 12. *Turn. Musc. Hib. p.* 179. *Fl. Brit. p.* 1320. *Schwaegr. Suppl. v.* 1. *P. II. p.* 244. *Hobs. Br. Mosses, v.* 1. *n.* 86. *Drum. Musc. Scot. v.* 2. *n.* 72. *Musc. Brit. ed.* 2. *v.* 176. *t.* 26.—*H. brevirostre, E. Bot. t.* 1647. (*not Ehrh.*).—*H. crenulatum, E. Bot. t.* 1261.—*Dill. Musc. t.* 38. *f.* 29.

On trees and banks, extremely common. *Fr.* Nov.

46. H. *velutínum*, Linn. (*velvet Feather-Moss*); stems variously branched, leaves erecto-patent ovate often approaching to lanceolate acuminate serrated striated, the nerve reaching half way, capsule ovate cernuous, seta rough, lid conical. *Linn. Sp. Pl. p.* 1595. *Hedw. St. Cr. v.* 4. *t.* 27. *Turn. Musc. Hib. p.* 167. *Fl. Brit. p.* 1305. *E. Bot. t.* 2421. *Hobs. Br. Mosses, v.* 1. *n.* 85. *Drum. Musc. Scot. v.* 1. *n.* 94. *Schwaegr. Suppl. v.* 1. *P. II. p.* 253. *Musc. Brit. ed.* 2. *p.* 177. *t.* 26.—*H. intricatum, Funck.*—*Schwaegr. Suppl. v.* 1. *P. II. p.* 233.—*H. Teesdalii, Dicks. ?*—*Dill. Musc. t.* 42. *f.* 61.

Woods and hedge-banks, common. *Fr.* March.—This is a species very closely allied to the preceding, and indeed, except in its smaller size, somewhat narrower *leaves* and their more upright direction, we can find no point of distinction.—Mr. Wilson thinks it may be but a *var.* of *H. rutabulum*.

47. H. *ruscifólium*, Neck. (*long-beaked water Feather-Moss*); stems variously branched, leaves loosely imbricated subpatent broadly acute serrated concave, the nerve reaching nearly to the summit, capsule ovate cernuous, lid rostrate. *Neck. Meth. Musc.*—*Turn. Musc. Hib. p.* 153. *Fl. Brit. p.* 1290. *E. Bot. t.* 1275. *Hobs. Br. Mosses, v.* 1. *n.* 84. *Drum. Musc. Scot. v.* 1. *n.* 92. *Musc. Brit. ed.* 2. *p.* 177. *t.* 26.—*H. riparioides, Hedw. St. Cr. v.* 4. *t.* 4. *Schwaegr. Suppl. v.* 1. *P. II. p.* 195.—*H. prolixum, Dicks.*—*H. Atlanticum, Desf.*—*Dill. Musc. t.* 38. *f.* 31, 32.

Upon wood and stones, in ponds and rivers. *Fr.* Oct.—The *stems* often exceed a span in length, and the *leaves*, in certain situations, attain a greater size than those of any other British species of this genus.

48. H. *striátum*, Schreb. (*common striated Feather-Moss*); stems variously branched, leaves patent cordato-acuminate serrated striated, the nerve reaching beyond the middle, capsule oblongo-ovate, cernuous, seta smooth, lid rostrate. *Schreb. Fl. Lips. p.* 91. *Hedw. St. Cr. v.* 4. *t.* 13. *Turn. Musc. Hib. p.* 180. *Fl. Brit. p.* 1321. *E. Bot. t.* 1648. *Schwaegr. Suppl. v.* 1. *P. II. p.* 238. *Hobs. Br. Mosses, v.* 1. *n.* 87. *Drum. Musc. Scot. v.* 1 *n.* 84. *Musc. Brit. ed.* 2. *p.* 178. *t.* 26.—*H. longirostrum, Ehrh.*—*Dill. Musc. t.* 38. *f.* 30.

Woods and shady banks, common. *Fr.* Nov.—Allied to *H. rutabulum;* but a larger and more robust plant, with *leaves* more patent, broader and more decidedly striated, with a shorter point and longer

nerve; the *setæ* are smooth and the *lid* rostrate. — A pretty small *var.* is found by Mr. Wilson, growing at Mucruss, Ireland, together with *H. crassinervium*, often bearing 2 *setæ* from the same perichætium.

49. H. *confértum*, Dicks. (*clustered Feather-Moss*); stems variously branched, leaves erecto-patent ovato-acuminate concave serrated their nerve reaching half way, capsule ovato cernuous, seta smooth, lid rostrate. *Dicks. Cr. Fasc.* 4. *t.* 11. *f.* 4. *Fl. Brit. p.* 1304. *E. Bot. t.* 2407. *Schwaegr. Suppl. v.* 1. *P. II. p.* 199. *t.* 90. *Hobs. Br. Mosses, v.* 2. *n.* 67. *Drum. Musc. Scot. v.* 2. *n.* 73. *Musc. Brit. ed.* 2. *p.* 178. *t.* 26.—*H. serrulatum, Hedw. Sp. Muse. t.* 60. *E. Bot. t.* 1262.

Trunks of trees, old rails and banks. *Fr.* Nov. — A small *variety* of this, growing on trees, has the *leaves* occasionally subsecund.

B. *Leaves squarrose.*

50. H. *cuspidátum*, Linn. (*pointed Bog Feather-Moss*); leaves loosely set ovate concave nerveless entire the lower ones squarrose those at the summit closely imbricated into a cuspidate point, capsule oblong curved cernuous, lid conical. *Linn. Sp. Pl. p.* 1595. *Turn. Musc. Hib. p.* 177. (*excl. var.* β.). *Fl. Brit. p.* 1317. *E. Bot. t.* 2407. *Schwaegr. Suppl. v.* 1. *P. II. p.* 228. *Hobs. Br. Mosses, v.* 1. *n.* 83. *Drum. Musc. Scot. v.* 2. *n.* 74.—*Dill. Musc. t.* 39. *f.* 34.

Bogs and wet places. *Fr.* Nov. — In habit, very similar to *H. cordifolium*, a dark *var.* of which, Mr. Turner has made his *var.* β. The present moss is easily known by its sharp cuspidate points; it grows, in water, to a considerable size.

51. H. *cordifólium*, Hedw. (*heart-leaved Feather-Moss*); leaves loosely set squarrose cordato-ovate obtuse concave entire, the nerve reaching very nearly to the point, capsule oblong curved cernuous, lid conical. *Hedw. St. Cr. v.* 4. *t.* 37. *Fl. Brit. p.* 1318. *E. Bot. t.* 1447. *Schwaegr. Suppl. v.* 1. *P. II. p.* 229. *Hobs. Br. Mosses, v.* 2. *n.* 68. *Drum. Musc. Scot. v.* 2. *n.* 75. *Musc. Brit. ed.* 2. *p.* 179. *t.* 26.—*H. cuspidatum*, β. *Turn. Musc. Hib. p.* 177.

Bogs. *Fr.* March. — A purple *var.* of this moss, generally barren, is found in alpine situations, frequently assuming a fasciculated appearance, with the tops of the branches having the leaves convolute; if the *nerve* of the *leaf* be not accurately observed, it may be taken for *H. cuspidatum.* In this state it is *var.* β. of that species, in Mr. Turner's *Musc. Hib.*

52. H. *polymórphum*, Hedw. (*variable-leaved Feather-Moss*); leaves loosely set squarrose cordate much acuminated entire, their nerve disappearing more than half way up, capsule oblongo-ovate curved cernuous, lid conical. *Hedw. Sp. Musc. t.* 66. *Musc. Brit. ed.* 2. *p.* 179. *t.* 26.—*H. chrysophyllum, Brid. Musc. v.* 2. *t.* 2. *f.* 2.

Limestone rocks, in Ireland. Chalky downs in Sussex, *Mr. Borrer.* Plentiful in clayey fallows, near Over and other parts of Cheshire, not

often bearing fruit, *Mr. Wilson.* Near Edinburgh, *Dr. Greville.* *Fr.* Apr. — It seems doubtful if this may not be a small *variety* of *H. stellatum*, which Mr. Drummond has observed to vary with nerved and nerveless *leaves.*

53. H. *stellátum*, Schreb. (*yellow starry Feather-Moss*); leaves loosely set squarrose cordate much acuminated entire (mostly) nerveless, capsule oblongo-ovate curved cernuous, lid conical. *Musc. Brit. ed.* 2. *p.* 180. *t.* 26.—*α. majus. H. stellatum, Schreb. Fl. Lips. p.* 92. *Hedw. Sp. Musc. p.* 280. *Turn. Musc. Hib. p.* 183. *Fl. Brit. p.* 1322. *E. Bot. t.* 1302. *Schwaegr. Suppl. v.* 2. *p.* 144. *Hobs. Br. Mosses, v.* 2. *n.* 69. *Drum. Musc. Scot. v.* 2. *n.* 76.—*Dill. Musc. t.* 39. *f.* 35.—*β. minus. H. squarrulosum, E. Bot. t.* 1709.—H. *polymorphum, Funck, Deutschl. Moose, t.* 39. *f.* 35.

In marshes. *β.* On stone walls and rocks. *Fr.* May. — The larger and more usual state of this plant is erect and of a fine yellow-brown colour; the smaller is creeping, of a green colour, and has the *leaves* somewhat more recurved.

54. H. *Halléri*, Linn. (*Hallerian Feather-Moss*); stems creeping with short erect branches, leaves broadly ovate acuminate serrated very obscurely and shortly 2-nerved their extremities remarkably recurved, capsule oblongo-ovate cernuous, lid conical. *Linn. Diss. Musc. p.* 34. *Hedw. St. Cr. v.* 4. *t.* 21. *Schwaegr. Suppl. v.* 1. *P. II. p.* 283. (*excl. the syn. of H. dimorphum*). *Grev. Scot. Cr. Fl. t.* 174. *Musc. Brit. ed.* 2. *p.* 180. *Suppl. t.* 5.

Rocks on Ben Lawers, Scotland, extremely rare, *Greville, Arnott, Hook.* *Fr.* ——. — This moss is remarkable for its regular and much recurved *leaves.* Although so rare in Britain, it is abundant in Switzerland.

55. H. *dimórphum*, Brid. (*dimorphous Feather-Moss*); stems vaguely pinnated, leaves cordato-ovate concave serrulated erecto-patent obscurely 2-nerved at the base those of the stems acuminated and reflexed at the extremity those of the branches acute and nearly straight, capsule ovate cernuous, lid conical. *Brid. Meth. p.* 165. *Grev. Scot. Cr. Fl. t.* 160. *Musc. Brit. ed.* 2. *p.* 181. *Suppl. t.* 5—*H. Halleri, var. Schwaegr. Suppl. v.* 1. *P. II. p.* 235.

Under rocks, in very shady places, upon Ben Lawers, *Mr. Arnott.* *Fr.* ——. — Dr. Schwaegrichen and Mr. Wilson, two high authorities, are disposed to consider this a *var.* or state of *H. Halleri;* and the fact of their being found upon one and the same mountain, and only there, would seem to strengthen such an opinion.

56. H. *lóreum*, Linn. (*rambling mountain Feather-Moss*); leaves recurved squarrose lanceolate much acuminated concave serrated striated faintly 2-nerved at the base, capsule ovato-globose cernuous, lid hemisphærical suddenly apiculated. *Linn. Sp. Pl. p.* 1593. *Turn. Musc. Hib. p.* 183. *Fl. Brit. p.* 1324. *E. Bot. t.* 2072. *Schwaegr. Suppl. v.* 1. *P. II. p.* 293. *Hobs.*

Br. Mosses, v. 1. *n.* 91. *Drum. Musc. Scot. v.* 2. *n.* 77. *Musc. Brit. ed.* 2. *p.* 181. *t.* 26.—*Dill. Musc. t.* 39. *f.* 40.

Woods and on heaths, among bushes. *Fr.* Dec.— From a span to a foot in length, scarcely thickened at the extremity of the *stem;* the lower *branches* attenuated and often rooting. *Leaves* frequently subsecund.

57. H. *tríquetrum*, Linn. (*triquetrous Feather-Moss*); leaves squarrose cordate gradually acuminated plane serrated faintly striated with two nerves at the base, capsule ovato-globose, lid conical. *Linn. Sp. Pl. p.* 1593. *Turn. Musc. Hib. p.* 186. *Fl. Brit. p.* 1325. *E. Bot. t.* 1622. *Schwaegr. Suppl. v.* 1. *P. II. p.* 80. *Hobs. Br. Mosses, v.* 1. *n.* 90. *Drum. Musc. Scot. v.* 1. *n.* 93. *Musc. Brit. ed.* 2. *p.* 182. *t.* 26.—*Dill. Musc. t.* 38. *f.* 28.

Woods, abundant. *Fr.* Dec.— This is a robust plant, 6—8 or 10 inches long. *Stems* pinnated, much thickened at the extremity; the *branches* attenuated and often rooting.

58. H. *breviróstre*, Ehrh. (*common rough-stalked Feather-Moss*); leaves squarrose broadly ovate concave often striated acuminated suddenly and with an evident contraction, so as to terminate in a long narrow point serrated faintly 2-nerved at the base, capsule ovate, lid short conical. *Ehrh.* (*not Sm.*)— *Schwaegr. Suppl. v.* 1. *P. II. p.* 279. *Hobs. Br. Mosses, v.* 2. *n.* 70. *Musc. Brit. ed.* 2. *p.* 182. *Suppl. t.* 5. *Grev. Scot. Cr. Fl. t.* 337.—*H. triquetrum, β. minus, Musc. Brit. ed.* 1. *p.* 108.

Woods, in various parts of England, Scotland, and the South of Ireland. (*Wills.*) *Fr.* Nov.— A very distinct moss, though in *Musc. Brid. ed.* 1. it was considered a *var.* of *H. triquetrum.* It is perhaps more nearly allied, in some respects, to *H. striatum.*— The recently ripe *capsules*, Mr. Wilson observes, are highly polished.

59. *H. squarrósum*, Linn. (*drooping-leaved Feather-Moss*); leaves squarrose widely cordate very much acuminated and recurved serrated faintly 2-nerved at the base, capsule ovato-globose cernuous, lid conical. *Linn. Sp. Pl. p.* 1593. *Turn. Musc. Hib. p.* 184. *Fl. Brit. p.* 1323. *E. Bot. t.* 1593. *Schwaegr. Suppl. v.* 1. *P. II. p.* 82. *Hobs. Br. Mosses, v.* 1. *n.* 92. *Musc. Brit. ed.* 2. *p.* 182. *t.* 26.—*Dill. Musc. t.* 39. *f.* 38, 39.

Woods and on heaths, common. *Fr.* Nov.—*Stems* slender, 4—6 inches long, variously branched, with the *leaves* often recurved at the extremity, so that their bases there form a hollow cup or disk.

2. *Leaves secund.*

A. *Leaves with a single nerve.*

60. H. *filícinum*, Linn. (*lesser golden Fern Feather-Moss*); branches pinnate, leaves especially the upper ones falcato-secund broadly ovate acuminate serrated their nerve reaching to the point, capsule oblongo-ovate curved cernuous, lid conical. *Linn. Sp. Pl. p.* 1500. *Hedw. Sp. Musc. t.* 76. *f.* 5—10. *Turn. Musc. Hib. p.* 197. *Fl. Brit. p.* 1334. *E. Bot. t.* 1570. *Hobs. Br. Mosses, v.* 2. *n.* 71. *Drum. Musc. Scot. v.* 2. *n.* 79. *Schwaegr.*

Suppl. v. 1. *P. II. p.* 297. *Musc. Brit. ed.* 2. *p.* 183. *t.* 26.— *H. dubium, Sw.*—*E. Bot. t.* 2126. *Turn. Musc. Hib. p.* 195.— *H. fallax, Brid. Musc. v.* 3. *t.* 3. *f.* 1. *E. Bot. t.* 2127.—*H. fluviatile, Sw.*?—*Hedw. Sp. Musc. p.* 277. *t.* 72. *f.* 4.?—*Dill. Musc. t.* 36. *f.* 19.

Bogs and sides of rivulets. *Fr.* (not frequent) Apr.—The *stems* are erect, pinnated, frequently clothed with downy ferruginous *roots;* and the stems themselves and *nerves* of the *leaves* are reddish-brown. The *cauline leaves* are the shortest and broadest, with the *nerve* excurrent, which is characteristic of the species and together with the less falcate foliage distinguishes it from *H. commutatum*, notwithstanding that Schwaegrichen has lately united them. The large *var.*, growing in running water, is the *H. fallax* of *E. Bot.* and probably of *Bridel. H. falcatum* of Schwaegr. *Suppl. v.* 3. *t.* 145. seems to be scarcely different from this.

61. H. *atro-vírens*, Dicks. (*dark green Feather-Moss*); stems variously branched procumbent, leaves all slightly secund broadly ovate with an attenuated obtuse point, the nerve running nearly to the summit, capsule ovate cernuous, lid conical. *Dicks. Cr. Fasc.* 2. *p.* 10. *Turn. Musc. Hib. p.* 169. *Fl. Brit. p.* 1307. *E. Bot. t.* 2422. *Musc. Brit. ed.* 2. *p.* 184. *t.* 26.—*H. filamentosum, Dicks. Cr. Fasc.* 2. *p.* 11. *Fl. Brit. p.* 1308. *Brid. Musc. p.* 167.—*H. attenuatum, Dicks.*—*E. Bot. t.* 2420. (*not Leskea attenuata, Hedw.*)—*Leskea incurvata, Hedw. Sp. Musc. t.* 53. (*not Hypnum incurvatum, Mohr.*)

Trees and rocks, in mountainous countries. *Fr.* ——.—This, in many points, comes near *H. filicinum;* but differs in being procumbent, in its loose and straggling ramification, more closely set, shorter, more concave, broader and more obtuse *leaves*, with the margin more reflexed, and quite entire, the *nerve* broader, of the same colour as the leaf, disappearing below the point: besides all which, the texture of the foliage is thicker and softer with distinct cellules: whereas in *H. filicinum* the leaves are somewhat scariose.—I have remarked, under *H. medium*, its affinity to that species.

62. H. *palústre*, Linn. (*marsh Feather-Moss*); leaves secund ovate somewhat acuminate concave entire the margins incurved above, the nerve short often forked sometimes obsolete, capsule oblongo-ovate cernuous, lid conical. *Linn. Sp. Pl. p.* 1593. *Turn. Musc. Hib. p.* 191. *Fl. Brit. p.* 1329. *E. Bot. t.* 1655. *Schwaegr. Suppl. v.* 1. *P. II. p.* 292. *Hobs. Br. Mosses, v.* 1. *n.* 88. *Drum. Musc. Scot. v.* 2. *n.* 80. *Musc. Brit. ed.* 2. *p.* 185. *t.* 26.—*H. luridum, Hedw. St. Cr. v.* 4. *t.* 38.—*H. fluviatile, Turn. Musc. Hib. p.* 192. *E. Bot. t.* 1303. (*not Hedw.*)—*H. adnatum, Turn. Musc. Hib. p.* 165. *E. Bot. t.* 2406. (*not Hedw.*) —*Dill. Musc. t.* 37. *f.* 27.

Banks of rivers and standing water, and on wet rocks, abundant. *Fr.* Apr.—A very variable species. The *stems*, or rather perhaps the principal *branches*, are upright, thickly crowded; the *leaves* flaccid, varying from a deep lurid green, the most common tint, to a bright and

pale yellow, in some situations. The *nerve* is sometimes obsolete, rarely half the length of the leaf, more frequently forked or double.

63. H. *flúitans*, Linn. (*floating Feather-Moss*); leaves loosely imbricated the upper ones especially falcato-secund all lanceolato-subulate scarcely serrated at their points, the nerve reaching nearly to the summit, capsule ovato-oblong curved cernuous, lid conical. *Linn. Fl. Suec. ed.* 2. *p.* 399. *Hedw. St. Cr. v.* 4. *t.* 36. *Turn. Musc. Hib. p.* 182. *Fl. Brit. p.* 1319. *E. Bot. t.* 1448. *Schwaegr. Suppl. v.* 1. *P. II. p.* 304. *Hobs. Br. Mosses, v.* 2. *n.* 60. *Drum. Musc. Scot. v.* 2. *n.* 83. *Musc. Brit. v.* 2. *p.* 186. *t.* 24.—*Dill. Musc. t.* 38. *f.* 33.

In pools and streams of water; rarely fructifying, except in places that are only occasionally inundated. *Fr.* Dec.—*Stems* often a span or more long. *Colour* varying from pale green to a deep purple in alpine rivulets.

64. H. *adúncum*, Linn. (*claw-leaved Feather-Moss*); leaves falcato-secund lanceolato-subulate concave or almost semicylindrical entire the nerve disappearing below the summit, capsule oblongo-ovate curved cernuous, lid conical. *Musc. Brit. ed.* 2. *p.* 186. *t.* 26.—*α. revolvens;* leaves narrow, very falcate. *Linn. Sp. Pl. p.* 1592. *Hedw. St. Cr. v.* 4. *t.* 24. *Turn. Musc. Hib. p.* 189. *Fl. Brit. p.* 1327. *Schwaegr. Suppl. v.* 1. *P. II. p.* 299. *Hobs. Br. Mosses, v.* 1. *n.* 93. *Drum. Musc. Scot. v.* 2. *n.* 81.—*H. revolvens, Sw.*—*Turn. Musc. Hib. p.* 188. *E. Bot. t.* 2073.—*Dill. Musc. t.* 37. *f.* 26.—*β. rugosum;* leaves wider, less falcate somewhat rugose. *Linn. Mant. p.* 131. *E. Bot. t.* 2250. (*not Hedw. nor Schwaegr.*)—*H. lycopodioides, Schwaegr. Suppl. v.* 2. *p.* 300.—*Dill. Musc. t.* 37. *f.* 24.

Bogs, common. *Fr.* May.—The *leaves* are of a peculiarly soft, flaccid and membranaceous texture.

65. H. *uncinátum*, Hedw. (*sickle-leaved Feather-Moss*); leaves falcato-secund lanceolato-subulate serrated striated the nerve disappearing below the point, capsule cylindrical curved cernuous, lid conical. *Hedw. St. Cr. v.* 4. *t.* 5. *Turn. Musc. Hib. p* 190. *Fl. Brit. p.* 1328. *E. Bot. t.* 1600. *Schwaegr. Suppl. v.* 1. *P. II. p.* 304. *Hobs. Br. Mosses, v.* 1. *n.* 89. *Drum. Musc. Scot. v.* 2. *n.* 82. *Musc. Brit. ed.* 2. *p.* 187. *t.* 26.

Moist banks and stone walls, abundant in subalpine countries. *Fr.* June.—The slender *stems*, which are pinnated, the long and uncinate *leaves* of a brighter colour, together with their striæ and serratures, abundantly distinguish this from *H. aduncum* and all its affinities.

66. H. *rugulósum*, Web. et Mohr, (*wrinkle-leaved Feather-Moss*); leaves secund ovato-lanceolate serrated nearly plane crisped transversely when dry the margins recurved the nerve reaching half-way. *Web. et Mohr, Fl. Cr. Germ. p.* 366. *Musc. Brit. ed.* 2. *p.* 187. *t.* 26.—*H. rugosum, Hedw. Sp. Musc. p.* 293. *et St. Cr. v.* 4. *t.* 23. *f. A.* (*leaf only*). *Schwaegr. Suppl. v.* 1. *P. II. p.* 301.

On the ground, in heathy places, near Thetford, *F. K. Eagle, Esq.*—Mountainous parts of Scotland, especially in Breadalbane. *Fr.* un-

known.—This lies on the ground in dense tufts of a yellow-brown colour. The transverse undulations are peculiarly striking, even to the naked eye, in which particular, as well as in the broader and shorter, more plane, secund, but not falcate, *leaves*, it differs from all the *varieties* of *H. aduncum*. The only species that is very closely allied to this is the *H. robustum* (*Musc. Exot.*) of the N. W. Coast of America.

67. H. *commutátum*, Hedw. (*curled Fern Feather-Moss*); stems pinnated, leaves falcato-secund cordate very much acuminate serrated their margins reflexed the nerve disappearing below the summit, capsule oblong curved and cernuous, lid conical. *Hedw. St. Cr. v.* 4. *t.* 26. *Turn. Musc. Hib. p.* 196. *Fl. Brit. p.* 1333. *E. Bot. t.* 1569. *Hobs. Br. Mosses, v.* 1. *n.* 94. *Drum. Musc. Scot. v.* 2. *n.* 84. *Musc. Brit. ed.* 2. *p.* 188. *t.* 27.—*H. filicinum, Schwaegr. Suppl. v.* 1. *P. II. p.* 297.—*Dill. Musc. t.* 36. *f.* 19.

Wet places, particularly in a calcareous soil. *Fr.* May.—Though often confounded with *H. filicinum*, this may be distinguished by its larger size, much less rigid *stems* and *leaves*, and its paler green colour. The *leaves*, too, for want of the excurrent rigid *nerve*, are disposed to be more curved and to become twisted when dry.

B. *Leaves destitute of a nerve, or furnished with two very indistinct ones at the base.*

68. H. *scorpioídes*, Linn. (*scorpion Feather-Moss*); leaves secund broadly ovate ventricose obtuse somewhat apiculate entire nerveless or obscurely 2-nerved at the base, capsules oblongo-ovate curved cernuous. *Linn. Sp. Pl. p.* 1592. *Hedw. Sp. Musc. p.* 295. *Schwaegr. Suppl. v.* 2. *P. II. p.* 293. *t.* 95. *Turn. Musc. Hib. p.* 187. *Fl. Brit. p.* 1326. *E. Bot. t.* 1039. *Hobs. Br. Mosses, v.* 2. *n.* 72. *Drum. Musc. Scot. v.* 2. *n.* 85. *Musc. Brit. ed.* 2. *p.* 188. *t.* 27.

Bogs, common. *Fr.* March.—This, which may rank among the largest of the British mosses, is at once distinguished from its affinities by its broad and nerveless *leaves*. In habit, it is allied to *H. aduncum*.

69. H. *Silesiánum*, Beauv. (*Silesian Feather-Moss*); leaves loosely imbricated secund narrow lanceolate acuminate serrated nerveless or very obscurely 2-nerved at the base, capsule subcylindrical erecto-cernuous, lid conical obtuse. *Beauv. Prodr. d'Æth. p.* 70. *Web. et Mohr, Fl. Cr. Germ. p.* 343. *E. Bot. t.* 2016. *Schwaegr. Suppl. v.* 1. *P. II. p.* 287. *t.* 94. *Musc. Brit. ed.* 2. *p.* 189. *t.* 27.

On soil, in the clefts of rocks, mountains of Scotland, frequent. *Fr.* May.—Allied to *H. cupressiforme*, but much smaller, of more straggling growth, with more serrated, narrower and less falcate *leaves*, and a shorter *lid* to the *capsule*. In some respects, it approaches *H. pulchellum*. Frequently, the serratures occupy the whole margin from the base to the extremity.

70. H. *cupressifórme*, Linn. (*cypress-leaved Feather-Moss*); leaves closely imbricated more or less falcato-secund lanceolate acuminate entire except at the points which are usually serrated

very faintly two-nerved at the base, capsule cylindrical erecto-cernuous, lid conical with a point. *Musc. Brit. ed.* 2. *p.* 189. *t.* 27.—*a. vulgare;* stems broad semicylindrical, leaves falcato-secund. *Linn. Sp. Pl. p.* 1592. *Hedw. St. Cr. v.* 4. *t.* 23. *Turn. Musc. Hib. p.* 193. *Fl. Brit. p.* 1331. *E. Bot. t.* 1860. *Schwaegr. Suppl. v.* 1. *P. II. p.* 290. *Hobs. Br. Mosses, v.* 1. *n.* 95. *Drum. Musc. Scot. v.* 2. *n.* 86.—*H. nigro-viride, Dicks.*—*Turn. Musc. Hib. p.* 193. *E. Bot. t.* 1860.—*Dill. Musc. t.* 37. *f.* 23. *and t.* 41. *f.* 53.—*β. compressum;* stems slender compressed, leaves falcato-secund. *H. compressum, Linn. Mant. v.* 2. *p.* 310. —*Dill. Musc. t.* 36. *f.* 2.—*γ. tenue;* leaves very slightly curved narrow-lanceolate quite entire. *H. polyanthos, E. Bot. t.* 1664. *Turn. Musc. Hib. p.* 137. (*not of this work, nor Leskea polyanthos, Hedw.*)

Banks and trunks of trees, extremely common. *β.* particularly abundant in shady woods. *γ.* mostly on trees. *Fr.* Oct.—One of the most sportive of all mosses; but the best-marked *vars.* are defined above. The *var. γ.* is however the most remarkable, and has often been mistaken for *Leskea polyanthos* of *Hedw.* It is also very nearly allied to *H. incurvatum, Schrader* and *Schwaegr.*, which has a shorter and more drooping *capsule.*

71. H. *Crista-castrénsis,* Linn. (*Ostrich-plume Feather-Moss*); stems closely pectinated, leaves falcato-secund ovato-lanceolate acuminate serrulate striated faintly 2-nerved at the base, capsule oblong-ovate curved cernuous, lid conical. *Linn. Sp. Pl. p.* 1591. *Hedw. Sp. Musc. t.* 76. *f.* 1—4. *E. Bot. t.* 2108. *Hobs. Br. Mosses, v.* 2. *n.* 73. *Drum. Musc. Scot. v.* 1. *n.* 95. *Schwaegr. Suppl. v.* 1. *P. II. p.* 293. *Musc. Brit. ed.* 2. *p.* 190. *t.* 27.

Woods in Yorkshire, *Mr. Backhouse* and *Rev. James Dalton.* Not unfrequent in the mountain-woods of Scotland, and upon exposed rocks at a considerable elevation. Rare in *fr.* The *Rev. Colin Smith* finds it in that state abundantly, at Inverary, in Nov.?—The most elegant of all the *Hypna*, well marked by its large and beautifully feathery *stems.* In Clova, it grows along with *Linnæa borealis*, which is its common associate in the woods of Switzerland.

72. H. *mollúscum,* Hedw. (*plumy-crested Feather-Moss*); stems pectinated, leaves falcato-secund cordate much acuminated serrated scarcely striated faintly 2-nerved at the base, capsule oblongo-ovate curved cernuous, lid conical. *Hedw. St. Cr. v.* 4. *t.* 22. *Turn. Musc. Hib. p.* 198. *Fl. Brit. p.* 1335. *E. Bot. t.* 1327. *Hobs. Br. Mosses, v.* 1. *n.* 96. *Drum. Musc. Scot. v.* 1. *n.* 96. *Schwaegr. v.* 1. *P. II. p.* 293. *Musc. Brit. ed.* 2. *p.* 190. *f.* 27.—*Dill. Musc. t.* 36. *f.* 20.—*H. Crista-castrensis, Dicks.*

On the ground, in woods and among stones. *Fr.* Nov.—This has been taken, even by some able British Botanists, for the preceding; but not by Dillenius, as Sir J. E. Smith supposed; his figures A. and B. being truly our present plant.

HEPATICÆ.

Ord. III. Hepaticæ. *Juss.* Liverworts.

Fructification generally of two kinds; 1st. *Capsules*, in an early stage covered with a *calyptra*, which is tipped with an apparent *style*, often surrounded by a *perianth* or *calyx*, at length bursting the calyptra irregularly and rising on a peduncle, and opening at the extremity with 2 or 4, or many valves, destitute of operculum, bearing within numerous *seeds*, mixed (except in *Riccia* and perhaps *Sphærocarpus*) with spiral *filaments:* 2dly, oblong or mostly rounded and frequently shortly pedunculated reticulated bodies (*Anthers ?*), containing a very minutely granulated substance, which escapes by an aperture formed at the extremity.—Minute *plants*, frequently frondose sometimes, in *Jungermannia* for instance, leaf-bearing; the leaves often divided, never really nerved. From various parts of the fronds or leaves, *gemmæ* are produced in many instances. Their substance is loosely cellular, in general, easily reviving, after being dried, by the application of moisture. Sometimes the areolæ of the cells have an evident pore, as in *Marchantia* and *Targionia*, and then the plants, after being once dried, are found to revive very slowly.

Synopsis of the Genera.

1. Ríccia. *Capsule* sphærical, immersed in the frond, indehiscent, crowned with a *style* which alone is protruded.

2. Sphærocárpus. *Capsule* sphærical, surrounded by an obovate *perianth* (*?*) which is open at the summit.

3. Anthóceros. *Capsule* pedunculated, linear, 2-valved, having a central *columella* to which the *seeds* are attached, and arising from a tubular *perianth*.

4. Targiónia. *Common receptacle* of the *fruit* none; *perianth* globose, terminal, arising from the underside of the frond, 2-valved; *capsule* globose, included, opening irregularly, and filled with *seeds* and *spiral filaments*.

5. Marchántia. *Common receptacle* of the *fruit* pedunculated, peltate, bearing beneath shortly pedicellated pendent *capsules*, opening at the extremity with about 8 teeth, and filled with *seeds* and *spiral filaments*. *Anthers* (*?*) oblong, imbedded in a flat, carnose, sessile or pedunculated papillary disk.—*Gemmæ* abundant in this genus, on the frond, lenticular, contained in variously shaped receptacles, and germinating even while on the parent frond.

6. JUNGERMÁNNIA. *Common receptacle* of the *fruit* none: *perianth* or *calyx* monophyllous, tubular (rarely wanting): *capsule* 4-valved, terminating a *peduncle* which is longer than the perianth.

CRYPTOGAMIA HEPATICÆ.

1. RÍCCIA. *Linn.* Riccia.

Capsule sphærical, immersed in the frond, indehiscent, (covered by a *calyptra ?*), crowned with a *style* which alone is protruded. (*Musc. Brit. ed.* 2. *p.*211.)—Named in compliment to *Pietro Francesco Ricci*, a Florentine botanist.

1. R. *crystállina*, Linn. (*chrystalline Riccia*); frond carnose ovato-oblong 2—3-lobed, the divisions dichotomous. *Musc. Brit. ed.* 2. *p.* 212.—*α.* frond fleshy glaucous channelled, segments acute. *R. glauca, Linn. Sp. Pl. p.* 1605. *E. Bot. t.* 2546. *Hooker, Fl. Scot. P. II. p.* 110. *Lindenb. Syn. Hepat. p.* 117. —*R. minima, Linn. Sp. Pl. p.* 1605. *Dill. Musc. t.* 78. *f.* 10, 11. —*β.* frond thin nearly plane yellowish-green, segments obtuse. *R. crystallina, Linn. Sp. Pl. p.* 1605. — *Lindenb. Syn. Hepat. p.* 116. *Dill. Musc. t.* 78. *f.* 12.

On banks. *α.* in rather dry situations. *β.* in moist places, especially in the mould of garden-pots in the greenhouse and stove, Bot. Garden, Glasgow. *Fr.* March, Apr. — A careful examination of numerous specimens, both fresh and dried, enables me to assert that the *vars.* above named are all the same species, depending mainly on age and place of growth for their different appearance. The first, *α.*, including *glauca* and *minima*, Linn., these being only dependent on age and size, grows in comparatively exposed spots, and is small, fleshy, but little divided, grooved along its upper surface, and of a glaucous green colour. The *β.* again, which is commonly called *crystallina*, inhabiting moister places, is generally larger and thinner, with more numerous and obtuse segments and a yellowish-green hue. In both the *fronds* grow in orbicular tufts, radiating from the centre, and when fresh have a remarkably crystalline appearance, owing to the delicate and pellucid nature of the cellules, not unlike *Mesembryanthemum crystallinum*, which induces me to retain the present specific appellation.

2. R. ? *flúitans*, Linn. (*narrow floating Riccia*); aquatic floating, frond thin repeatedly forked, with linear obtuse segments generally notched at the extremity. *Linn. Sp. Pl. p.* 1606. *E. Bot. t.* 251. *Musc. Brit. ed.* 2. *p.*213.—*Ricciella fluitans, Braun.* —*Lindenb. Syn. Hepat. p.* 115. *Dill. Musc. t.* 74. *f.* 17.

Stagnant waters. Not found in Scotland. *Fr.* ——.— *Fronds* half an inch to 2 inches long, yellow-green, repeatedly dichotomous, segments linear, somewhat thickened, as if nerved in the centre grooved above when dry, semipellucid; reticulation indistinct; extremities obtuse,

opaque, sometimes appearing spotted, as if with young fructification [1], according to Mr. Wilson occasioned by scales on the lower part of the frond, but no peculiar organization exists to justify a belief in real fruit. When growing in ponds and ditches, this plant is large and quite destitute of fibrous radicles: but if thrown on the soil at the margins, it becomes smaller, with shorter segments, and fastens itself firmly to the ground by numerous fibrous roots.

3. R. *nátans*, Linn. (*broad floating Riccia*); frond obovate or inversely cordate once or twice lobed, clothed beneath and at the margin with numerous long pendent reticulated flat fimbriæ. *Linn. Syst. Nat. ed.* 12. *v.* 2. *p.* 708. *E. Bot. t.* 252. *Musc. Brit. ed.* 2. *p.* 214. *Lindenb. Syn. Hepat. p.* 121.—*R. capillata, Schm. Ic. t.* 74.—*Dill. Musc. t.* 78. *f.* 18.

Stagnant pools, England; but not general. *Fr.* ——.—*Fronds* always floating, half an inch long, between fleshy and membranaceous, pale-green above, slightly grooved in the centre, cells large, each cell consisting of smaller cellules, margin and underside clothed with numerous pendent, linear, membranaceous, dark purple, strongly veined fimbriæ. *Fruit* unknown in Britain; but appearing, from specimens communicated by Professor Torrey, New York, exactly like that of *R. crystallina*. Professor Henslow has sent me numerous specimens from near Cambridge.

4. R. *spúria*, Dicks. (*spurious Riccia*); "fronds membranaceous lobed pellucid, fructification beneath the sinuses of the lobes solitary exserted turbinate toothed." *Dicks. Cr. Fasc.* 4. *p.* 20. *t.* 11. *f.* 16. *Hook. Fl. Scot. P. II. p.* 110. *Musc. Brit. ed.* 2. *p.* 214. *Lindenb. Syn. Hepat. p.* 119.

Turfy marshes among the Scottish mountains, *Mr. Dickson*. *Fr.* ——.—Of this plant I know nothing, except from Dickson's figure and description above quoted, which seem to accord but ill with *Riccia*.

2. Sphærocárpus. *Mich.* Sphærocarpus.

Capsules (*?*) sphærical, surrounded by an obovate *perianth*, open at the summit. (*Musc. Brit. ed.* 2. *p.* 215.)—Named from σφαιρα, a *globe*, and καρπος, *fruit*, in allusion to the form of the supposed capsules.

1. S. *terréstris*, Sm. (*ground Sphærocarpus*). *E. Bot. t.* 299. *Musc. Brit. ed.* 2. *p.* 215. *Lindenb. Syn. Hepat. p.* 111.—*Targionia sphærocarpa, Dicks. Cr. Fasc.* 1. *p.* 8. *Schm. Ic. t.* 28. *f.* 11. *Mich. Gen. t.* 3.—*Dill. Musc. t.* 78. *f.* 17.

Fields, especially clover layers: plentiful in Norfolk. *Fr.* Feb.—It is with regret that I am obliged to give but an unsatisfactory account of this plant, which, although found plentifully in my own neighbourhood, I have never been able to gather in perfect fructification. Various are the accounts given of it by Schmidel, Sprengel and Weber: but I confine myself to detailing my own observations.—The *Fronds* grow singly or collected in small patches on the ground, each from one-fourth to one-half an inch in length, plane, slightly waved, the margin variously lobed, lobes short and rounded: *texture* thin, beautifully reticulated,

[1] Lindenberg describes the fructification as "*Caps.* globosa, in inferiori frondis pagina sessilis (circumcissa?). *Semina* elateribus destituta."

colour pale-green, somewhat glaucous: underside adhering to its place of growth by numerous fibrous *radicles;* superior surface, except towards the margin, covered with many obovate *follicles* or *perianths,* of the same texture and colour as the frond, varying much in dimensions; the largest and oldest about the size of mustard-seed, truncated at the top and perforated: the aperture entire at the margin. Within these at the base, both in the smaller and larger perianths, are sometimes 2—5 extremely minute, linear, pistilliform bodies; at other times, one of these is oblong, swollen and lengthened, exactly like the young germen of a *Jungermannia.* Again, much more rarely, I have found one of these *pistilliform bodies* enlarged into a perfectly spherical form, tipped with a short, slender *style,* the whole not larger than an eighth of the perianth: the contents of so small a body I could not satisfactorily ascertain, but they appeared, when pressed out, to consist of a pulpy substance.

3. Anthóceros. *Linn.* Anthoceros.

Capsule pedunculated, linear, 2-valved, with a central *columella* to which the *seeds* are attached and arising from a tubular *perianth.* (*Musc. Brit. ed.* 2. *p.* 216.) Name; ανθος, a *flower,* and κερας, a *horn:* from the horn-like fructification.

1. A. *punctátus,* Linn. (*dotted Anthoceros*); frond obovato-oblong flattish waved and cut at the margin. *Linn. Sp. Pl. p.* 1606. *E. Bot. t.* 1537. *Musc. Brit. ed.* 2. *p.* 216. *Lindenb. Syn. Hepat. p.* 113.—*Dill. Musc. t.* 68. *f.* 1.—*A. lævis, Linn. Sp. Pl. p.* 1606. *Schm. Ic. t.* 19. *Lindenb. Syn. Hepat. p.* 112.—*A. major, Mich. Gen. t.* 7. *f.* 1. *E. Bot. t.* 1538.—*Dill. Musc. t.* 68. *f.* 2.

Sides of ditches and water-courses, in very moist situations. *Fr.* Spring.—*Fronds* from one-half to three-fourths of an inch long, procumbent, often forming orbicular imbricated patches, radiating from the centre; each more or less obovato-oblong, plane or slightly waved above, the extremities somewhat dichotomously divided into short, rounded segments, which are waved and broadly notched at the margin, sometimes even laciniated, segments always obtuse. *Texture* between fleshy and membranaceous, inclining to the former, generally of a darkish green colour, paler at the margins. *Cellules* distinct, oblong, with a pore in the centre:—there is no midrib, the fibrous radicles springing from various parts of the under surface of the fronds; *male and female fructification* generally abundant on the same individual. *Anthers* exactly sphærical, shortly pedicellated, of a yellowish-orange colour, included in cup-shaped, deeply and sharply laciniated *receptacles,* on the upper surface of the fronds. The *female fructifications,* of which there are several on each frond, appear first in the form of conical tubercles, similar to the frond in colour and texture, and consisting in fact of the epidermis. In a short time, these, which we have called *perianths,* attain the height of 2 lines, become cylindrical, opening at the mouth with a truncated, rather jagged orifice; whence proceeds a linear, subulate, slightly curved *capsule,* which rising about 2 inches and elevated on a succulent *fruitstalk* scarcely longer than the perianth, bursts from the extremity into two narrow linear valves, which are partially twisted round each other. The opening of the capsule presents a central *filament* or *columella,* equal in length to the capsule, and covered with numerous roundish, opaque, brown *seeds,* each of which is marked by lines, indicating its being composed of 3 or 4 smaller bodies:—these are attached by means of short, simple

or forked, rather flat, brownish, semipellucid stalks, which have no appearance of a double spiral helix, as figured by Schmidel.

Besides the organs of fructification described above, I observe in the surface of the frond, oval or elliptical, compactly granulated, dark green bodies, similar to what have been detected in *Jungermannia Blasia*.

I have been surprised to find an increasing difficulty, as these investigations proceeded, in discriminating between *A. punctatus* and *A. lævis;* 2 species adopted by all preceding authors. The common appearance of the plant is characterized above: its extreme varieties have been described as 2 species by other Botanists:—the larger kind, with the least divided margin, is *A. major*, Sm.; the smaller and more divided one is *A. punctatus*, Sm. All, however, remark that the fructification is alike, and both Smith and Weber assert that the 2 plants often grow intermixed. The *A. multifidus* of Dickson can hardly, I think, belong to this genus. Dillenius does not figure the fructification; nor does Mr. Dickson, who is the authority for its being considered of British origin, take any notice of it; it is wholly omitted in *E. Bot.*; and both the descriptions of *Dickson* and *Dill.*, and the figure of the latter, induce me to refer it with little hesitation to *Jung. multifida*.

4. Targiónia. *Mich.* Targionia.

Common receptacle of the *fruit* none; *Perianth* globose, terminal, arising from the underside of the frond, 2-valved; *capsule* globose, included, opening irregularly and filled with *seeds* and *spiral filaments*. (*Musc. Brit. ed.* 2. *p.* 218.)—Named in honour of *John Anthony Targioni*, a Florentine Botanist.

1. T. *hypophylla*, Linn. (*flat-leaved Targionia*). *Linn. Sp. Pl. p.* 1603. *E. Bot. t.* 287. *Hooker, Fl. Scot. P. II. p.* 119. *Musc. Brit. ed.* 2. *p.* 218. *Lindenb. Syn. Hepat. p.* 110.—*Dill. Musc. t.* 78. *f.* 9.

Banks, in rather moist but exposed situations, England and Scotland; but not general. *Fr.* Apr. May.—*Fronds* forming large patches, imbricated, oblongo-obovate, plane, between coriaceous and fleshy, *margins* entire, very deep green, purplish at the edges, not obviously reticulated, but furnished with numerous oval pores on the upper surface; underneath only is the appearance of a midrib, which is prominent and covered with numerous obtuse *radicles*, on each side of which are many purple, transversely oblong, membranous scales, as in *Marchantia*. Immediately beneath the extremity, or the underside of the frond, is a solitary *perianth*, globose, of a deep purplish-black colour, and a texture between membranaceous and coriaceous, marked with a vertical prominent line, from which it becomes dehiscent, and consequently 2-valved. Within this perianth are seen, in an early stage, a few pistilliform bodies, one of which becomes a sphærical *germen* covered with a *calyptra* which is tipped with a rather long *style;* the calyptra bursts irregularly and vertically. The sphærical *capsule* is protruded beyond it; but never reaches further than the perianth. *Fruitstalk* very short and succulent. *Capsule* dark brown, opening at the extremity with several unequal segments, and discharging innumerable brown *seeds*, mixed with short *spiral filaments*, composed of a double helix.

5. Marchántia. *Mich.* Marchantia.

Common receptacle of the *fruit* pedunculated, peltate, bearing beneath shortly pedicellated pendent *capsules*, opening at the

extremity with about 8 teeth, and filled with *seeds* and *spiral filaments*. *Anthers* (*?*) oblong, imbedded in a flat, carnose, sessile or pedunculated, papillary disk. *Gemmæ*, abundant in this genus, on the frond, lenticular, contained in variously shaped receptacles, and germinating even while on the parent frond.—(*Musc. Brit. ed.* 2. *p.* 219.)—Named in compliment to *Nicholas Marchant*, the first Botanist which the Royal Academy of Sciences at Paris admitted among its members.

1. M. *polymórpha*, Linn. (*polymorphous Marchantia*); receptacle of the capsules deeply cut in a stellated manner into about 10 narrow segments, that of the anthers pedunculated. *Linn. Sp. Pl. p.* 160. *E. Bot. t.* 110. *Hooker, Fl. Scot. P. II. p.* 119. *Musc. Brit. ed.* 2. *p.* 219. *Lindenb. Syn. Hepat. p.* 100.—*Dill. Musc. t.* 76. *f.* 6.

Moist and wet situations; also in dry spots when shaded; very common. *Fr.* July.—*Fronds* much imbricated, procumbent, erect only when growing in water, very variable in length, rarely simple, generally once or twice divided in a dichotomous manner, 1—4 or even 5 inches long; laciniæ mostly short, rounded and nearly entire; sometimes, as when growing in water, very much elongated, linear-oblong, marked on the upper surface with a depressed dark line, which, beneath, constitutes a prominent blackish midrib, whence, for nearly the whole length of the plant, spring numerous pale, silky, fibrous radicles. *Colour* generally an uniform dull green; the texture between fleshy and membranaceous, more approaching to the latter, strikingly cellular; cells oblong, furnished in the centre with a small pore, arranged in parallel lines, diverging upward from the midrib at an acute angle. *Fructification* dicœcious; fronds bearing anthers similar to those bearing capsules. *Male receptacle* greenish; the papillæ purple, supported on peduncles, springing from the base of a sinus at the extremity of the frond just beneath the margin; about one inch in length, obtusely quadrangular, thickened upwards. On one side of the peduncle are two grooves, each containing a bundle of filaments that pass through their whole length, and diverge, on the under side of the peltate receptacle, into as many rays as there are lobes to the receptacle. *Receptacle* flat on the summit, horizontal, papillose, fleshy, thin and membranaceous at the margin, and cut into about eight short, rounded lobes. *Anthers* equal in number to the papillæ on the surface of the receptacle, and imbedded in its fleshy portion: a vertical section shows them to be of nearly oval form and reticulated structure, filled with soft granular matter; they are surrounded by an ovate reticulated membrane, attenuated above and opening by an orifice through the papillæ. On the underside of the receptacle are numerous imbricated scales, radiating, so that each ray corresponds with a marginal lobe of the receptacle, and there covers the diverging fibres above mentioned. *Female fructification;—receptacle* of the capsules pedunculated; the *peduncle* 1—3 or 4 inches long, rising, as in the male fructification, and similar in shape and structure, but not thickened above. *Receptacle* hemisphærical, deeply divided to the base into 8—10 linear, cylindrical, decurved rays, covering as many involucres which are united at the base, and there intermixed with minute chaffy scales; these involucres are oblong, membranaceous, open at the extremity, and remarkably laciniated, enclosing at the base, while young,

two or three pendent *pistils*, as in *Jungermannia*, each surrounded by an ovate quadrifid membranaceous *perianth*. Of these pistils, one or more comes to maturity. The *calyptra* is obovate, tipped with a short *style* and bursting irregularly for the emission of the capsule. The *capsule* is ovate, pale greenish-brown, shortly pedicellated, so as to be protruded a little beyond the calyx, and opens into about eight short and nearly equal segments at the extremity, immediately overflowing with innumerable greenish-brown, sphærical *seeds*, intermixed with *spiral filaments* of the same colour, and formed of a double helix. When the capsules are mature, the segments of the receptacle are frequently bent back, so as to become erect from the expansion of the numerous capsules.

Besides these two modes of fructification, we find, on sterile as well as fertile individuals, at all seasons of the year, cup-shaped processes, in various parts of the upper surface of the frond and always on the midrib; of the same texture as the frond itself, but with more membranaceous, laciniated margins; within which are contained several lentil-shaped membranaceous bodies of a reticulated structure, and frequently furnished with pellucid dots: these are the *gemmæ*, which frequently throw out radicles before leaving those receptacles, and, striking root on the spots where they happen to fall, in time become perfect fronds.—I have been thus particular in my description, as the structure of the other species is very similar, while this is the most common of them all.

2. M? *lævis*, (*smooth Marchantia*). Wils. Mss.

Road-sides, or banks, Ballilickey, Ireland, *Mr. Wilson*. *Fr.* ——? Without perfect fructification. I do not venture to offer a specific character for this plant, which, nevertheless, Mr. Wilson has determined to be quite distinct from *M. polymorpha*, to which of all the known British species it seems most similar, but agreeing as to its fructification rather with *M. conica*. "*Frond* almost leathery, scarcely succulent, of a shining green above, and with many visible pores. *Pistilliferous receptacle* at first sessile, as in other species (at length perhaps elevated) depressed. *Pistils* not curved as in other species, and not apparently surrounded by an involucre, hence the Genus is doubtful. There are some obscure traces of organization in the disk of the receptacle, so that it is possible the perfect state may have anthers imbedded in this receptacle. The compact imbricated and convergent scales enveloping the fructification are very remarkable. — *Fructification* truly epiphyllous and not as in *M. polymorpha*.

3. M. *cónica*, Linn. (*conical Marchantia*); receptacle of the capsule conical ovate somewhat angular nearly entire at the margin, that of the anthers sessile. *Linn. Sp. Pl. p.* 1604. *E. Bot. t.* 504. *Hooker, Fl. Scot. P. II. p.* 120. *Musc. Brit. p.* 221.—*Dill. Musc. t.* 75. *f.* 1.—*Fegatella officinalis, Raddi, in Opusc. Scient. di Bologna, v.* 2.

Sides of mill-ponds and shady banks, common. *Fr.* March.—*Fronds* procumbent 3—5 inches long, several times divided in a dichotomous manner, the segments oblong, obtuse, margins scarcely waved or crenate; *colour* almost an uniform yellowish-green; *texture* more inclined to fleshy than membranaceous, the reticulation larger and more distinct than in any other species. *Cells* oblong and hexagonal, the central pore very conspicuous and surrounded by a whitish thickened margin; the midrib scarcely distinguishable on the upper surface but by a longitudinal de-

pression, beneath, however, prominent and thickly coloured, for its entire length, with the usual fibrous radicles ; among these radicles, and almost concealed by them, arise, on each side of the midrib, a few membranaceous oblique scales, which are more evident upon the young shoots or innovations, where the roots are fewer, and are there of a purple hue : occasionally, scales of a similar nature, but greenish colour, overlap the margins of the innovations at the extremity. These scales, when seen in their more perfect state, appear to be unequally 2-lobed at their anterior margins. *Fructification*, as far as I have observed, constantly diœcious. *Male receptacle* entirely sessile, arising, apparently, always from the midrib in various parts of its surface : in form and structure resembling the two preceding species. *Female receptacle* pedunculated : *peduncle* differing from that of other *Marchantiæ* in being remarkably succulent, as in *Jungermannia epiphylla*, becoming flat and apparently membranaceous when dry, and having, so far as we can observe, but one groove with one bundle of fibres; this peduncle is inserted in a concave disk, and is 2—4 inches long. The *receptacle* is conical, inclining to ovate, obtuse at the summit, the margins deflexed and cut into about six very short emarginate lobes ; *involucres* green, 2-valved; *calyx* quadrifid, and each seeming to contain but one ovate *capsule*, which is partially exserted and cut into several revolute segments. *Seeds* large, dark, olivaceous ; *spiral filaments* double. — The bruised *fronds* are singularly fragrant, resembling Bergamot.

4. M. *hemisphærica*, Linn. (*hemisphærical Marchantia*); receptacle of the capsules hemisphærical cut at the margin into 4—10 equal lobes, that of the anthers pedunculated with a thin margin, frond with large cells and pores. *Linn. Sp. Pl. p.* 1604. *E. Bot. t.* 503. and *t.* 2545? (*under M. commutata, Lindenb. Syn. Hepat. p.* 101. *M. androgyna, excl. the 2 lower figs.*) *Musc. Brit. ed. 2. p.* 222.—*M. androgyna, Linn.*? *M. quadrata, Scop. Carn. ed. 2. p.* 63.— *Rebouillia hemisphærica, Raddi, in Opusc. Scient. di Bologna.* — *Dill. Musc. t.* 75. *f.* 2.

Sides of mountain-streams and moist banks, not uncommon. *Fr.* Apr. — *Fronds* procumbent, imbricated, oblong, 1—3 inches long, rarely simple, generally forked, waved and crenate at the margin ; *texture* between carnose and membranaceous, inclining to the latter ; *colour* dark green above, frequently with a dark central line indicating the midrib, underside often purple at the margin, midrib prominent, throwing out numerous silky fibres, and on each side beset with purple scales, partially concealed by the roots, sometimes the centre of the frond below is purple ; on the upper surface the cells are very distinctly marked, and, as in *M. polymorpha*, furnished in the centre with a pore. *Fructification* monœcious, as well as diœcious ; *male receptacle* with short pedicels springing from the midrib in a sinus at the extremity of the frond; receptacle peltate, flat and papillose above, purplish, the margins somewhat reflected, cut into 4, 8, or 9 rounded lobes. *Anthers* as in *M. polymorpha*. *Female receptacle* with pedicels 2—4 inches long, hemisphærical, cut at the margin into 4—10 or 11 obtuse, deflexed lobes, covering as many membranaceous involucres, which are entire at the margins ; *calyces* white, membranaceous, quadrifid, 2—3 in each involucre. *Calyptra* as in the preceding. *Capsule* scarcely protruded at maturity, consequently on a very short fruit-stalk, dark brown, cut nearly halfway down into 7, 8 obtuse revolute segments, containing a great num-

ber of equally dark brown *seeds* and *spiral filaments*, as in *M. polymorpha*. *Gemmiferous scyphi* crescent-shaped, as in the genus *Lunularia* of *Micheli*. *Mr. Francis* sends me from Edgefield, Norfolk, specimens with *female fructification* only, which differ from the common appearance of the plant just described, by the more compactly cellular nature of the frond, so that the areolæ are not visible in a dry state.

A second *var.*, as I presume it to be, has been communicated by *Mr. Borrer*, from Sussex, with the fronds more elongated, their margins beautifully crenate, and, like the underside, of a deep purple; the cellules and pores less distinct than even in the last-mentioned *var.*; upon it I find the pedunculated male receptacles, and, lying among the specimens, but not attached to them, is a single female receptacle, apparently belonging to them, and having all the characters of that of *M. hemisphærica*. Still a third appearance of this species, is found growing abundantly on a bank, intermixed with *Targionia hypophylla*, in the New Forest, Hants, by Mr. Lyell. In this, likewise, the specimens have the fronds of a compact nature, their underside and margin of a deep purple, the upper surface, sometimes, especially in the dry state, apparently as destitute of areolæ as in the 2d var., whilst at other times, especially when moist, the areolæ and their pores are tolerably conspicuous. The female fructification, as seen and described to me by Mr. Lyell, seems precisely similar to that of *M. hemisphærica*; but the most remarkable peculiarity of this plant is that the male receptacles, which are very abundant, have hitherto always been found sessile, and imbedded, as it were, in the surface of the frond, situated near the extremities, whence, at the period of their decay, innovations of the frond are seen to issue.

The 3 *vars.* just described are found growing on comparatively dry banks, and to this may be attributed the compact nature of their fronds, the deep purple hue of the underside and margins, and the indistinctness of the cellules. The *M. quadrata*, Scop., which Smith refers to his *M. androgyna* in *E. Bot.*, may, I think, be quoted under *M. hemisphærica*.

I cannot help suspecting that *M. androgyna* of *E. Bot.*, at least, is nothing more than *M. hemisphærica*. I allude to the 2 upper figs.; the 2 lower ones, with more perfect fructification, are stated to be copied from Swiss specimens, and I have no hesitation in pronouncing them to be the *M. fragrans*, Balbis, a highly curious plant, never yet found in Britain. I however possess individuals of the same or an analogous species from Philadelphia and the Cape of Good Hope, as well as Switzerland and Savoy, and they constitute the very remarkable genus described by Nees von Esenbeck, in the *Flora Berolinensis*, under the name of *Fimbraria*. The essential character of Smith's *M. androgyna*, is to have the "calyx of the *female flowers* hemisphærical, with 4 clefts and 4 cells," which is by no means at variance with the common state of *M. hemisphærica*. The figures, too, are sufficiently characteristic, and in the form of the frond, more faithful than *M. hemisphærica*, *t.* 503. The upper left-hand plant has the appearance and purple edges of our Edgefield *var.*

The name *M. androgyna*[*] originated with Linnæus; but his character,

[*] *Dr. Taylor* has seen, in Ireland, that the same peduncle has sometimes on its summit the peltate disk, with one half of its summit having *capsules* pointing downwards, the other half with its upper surface having *anthers* imbedded. Can this have given origin to the name, *M. androgyna*?

as given in the *Sp. Pl.*, where it was first noticed, is " M. calyce communi integro hemisphærico," adding " monoica seu androgyna est hæc species :" he states it to be a native of Italy and Jamaica, and refers to *Micheli, t.* 2. *f.* 3. (the authority for the Italian plant,) and to *Dill. Musc. t.* 75. *f.* 3. (the authority for the Jamaica plant). Micheli's plant, as far as we can judge from the magnified figure, may possibly be that state of the species with sessile male receptacles above noticed as found by Mr. Lyell, and to which, if any, the name *androgyna* may still be applied; the female receptacles are equally divided with our *M. hemisphærica;* yet the fronds are much longer, narrower, and repeatedly divided in a dichotomous manner. With regard to Dillenius' plant from Jamaica, the fronds are still more unlike ours; and as is evident from his description and figure, they are furnished with gemmiferous scyphi and not with male receptacles. Now, it appears that Linnæus' character of *M. androgyna* was taken from a Siberian plant, described by Scopoli and Smith, under the name of *M. triandra*, and hence Smith observes, " our great naturalist erred in making its specific character *Calyx communis integer.*" To return again to the figs. in *E. Bot.*, there is no male fructification described; nor, so far as we can discover, any mark by which to distinguish it from *M. hemisphærica.*

Schmidel, under *M. hemisphærica, t.* 34. at *f.* 3. and *XIII.* has figured and has described what appear to be sessile male receptacles, on the same fronds with the pedunculated ones; and this would seem to strengthen our opinion of the 2 kinds being found on the same species.

5. M. *irrígua,* Wils. (*water Marchantia*) ; receptacle of the capsules hemisphærical cut at the margin into 5 or 6 lobes, that of the anthers pedunculated with a thickened margin, frond of a very close texture without pores. *Wils. MSS.*

In dripping places; Turk Cascade, near Killarney; Maghanabo Glen near Brandon mountain; Ballihasig Glen, near Cork, *Mr. Wilson. Fr.* Apr. May.—" *Fem. receptacle* hemisphærical, 5—6 rayed, each ray slightly split for the protrusion of the *capsule. Filaments* very long, thickened in the middle, *seeds* small. *Male receptacles* stalked, peltate, flattish or sometimes pitted in the centre, not bordered as in *M. hemisphærica. Frond* of a *wavy dark green,* of *close texture without pores,* furnished with a sort of midrib, covered beneath with silky radicles."— The shape of the antheriferous receptacle, Mr. Wilson observes, and the texture of the frond, seem chiefly to distinguish this from *M. hemisphærica;* the latter character is indeed quite visible in the dry state; and both in colour and texture the fronds look more like those of *Jungermannia epiphylla* than of any British *Marchantia.* I possess what appears to be the same species from Madeira and other southern countries.

6. JUNGERMÁNNIA. *Linn.* Jungermannia.

Common receptacle of the *fruit* none. *Perianth* or *calyx* monophyllous, tubular, sometimes double, rarely wanting. *Capsule* 4-valved, terminating a *peduncle,* which is longer than the perianth.— Named after *Louis Jungermann,* a German botanist.

1. *Foliaceous.*

A. *Stems without Stipules.*[1]

a. *Leaves inserted on all sides of the stem.*[2]

1. J. *Hookéri*, Sm. (*Hookerian Jungermannia*); stem erect somewhat branched, leaves imbricated on all sides ovate or oblongo-ovate here and there lobed or angled, fruit terminal, perianth none, calyptra large oblong fleshy smooth. *E. Bot. t.* 4. *Hook. Br. Jung. t.* 54. *Lindenb. Syn. Hepat. p.* 96.—*Gymnomitrion Hookeri, Corda, in Sturm Deutschl. Fl. cum Ic.*

Very rare. Boggy places at Cadnam, New Forest, Hants; and Kinnordy Moss, *C. Lyell, Esq. Fr.* Spring.—This very remarkable species which differs in habit from all other *Jungermanniæ*, has been most unnaturally combined with *J. concinnata* and distinguished as the Genus *Gymnomitrion* by Corda; and still more unnaturally with *J. Mackaii, serpyllifolia*, &c. to form the genus *Lejeunia* (of Libert.) by Sprengel.

The nature of this work does not give me the opportunity of discussing the necessity of separating the *Jungermanniæ* into other Genera, as has been done by Raddi and Corda and others. Their observations will tend to a much better knowledge of the species; but it requires a more extended acquaintance with exotic species than we yet possess, to form Genera upon solid grounds. Lindenberg, in his *Synopsis Hepaticarum Europæarum*, has, with great judgment, preserved the Genus in question entire; and his work is a model of accurate description and profound research.

b. *Leaves bifarious.*

* *Leaves undivided.*

2. J. *asplenioídes*, Linn. (*Spleenwort Jungermannia*); stems ascending branched, leaves obovato-rotundate ciliato-dentate somewhat recurved, fruit terminal and lateral, perianth oblong compressed oblique, the mouth truncated subciliated. *Linn. Sp. Pl. p.* 1597. *Hook. Brit. Jung. t.* 13. *E. Bot. t.* 1788. *Hobs. Br. Mosses, v.* 1. *n.* 111. *Lindenb. Syn. Hepat. p.* 72.—*Dill. Musc. t.* 69. *f.* 5, 6.

Moist woods, shady banks and among rocks; frequent. *Fr.* Apr.—This is one of the largest of our species; from 3 to 5 or even 6 inches in length.

3. J. *spinulósa*, Dicks. (*prickly-leaved Jungermannia*); stem erect branched, leaves ovate recurved with the margin and the apex on one side dentato-spinulose, fruit lateral and axillary, perianth roundish compressed, the mouth truncate ciliated. *Dicks. Cr. Fasc.* 2. *p.* 14. *Hook. Br. Jung. t.* 14. *E. Bot. t.* 2228. *Hobs. Br. Mosses, v.* 2. *n.* 111. *Lindenb. Syn. Hepat.*

[1] In this division will be found *J. Sphagni* and *J. compressa*, which have stipules only upon their young shoots.

[2] *J. trichophylla, setacea, julacea, laxifolia*, and *juniperina*, having been found to have bifarious leaves and stipules, are removed to the division b.

p. 73.—*Dill. Musc. t.* 70. *f.* 15, 16.—*β. tridentata;* leaves smaller fewer with 3 sharp spiniform teeth at the extremity. *J. tridenticulata, Mich. Am. v.* 2. *p.* 278.

Rocks in shady situations, especially in subalpine countries: yet *Mr. Lyell* finds it in the New Forest, Hants. *β.* Mountains near Bantry, *Miss Hutchins.* Scottish mountains. *Fr.* ——.—Though *perianths* are by no means unfrequent on this plant, I am not aware that its perfect fruit has ever been found in this country.

4. J. *decípiens,* Hook. (*deceptive Jungermannia*); stems erect flexuose nearly simple, lower leaves small ovate entire upper ones rotundato-ovate or subquadrate with here and there a spiniform tooth. *Hook. Br. Jung. t.* 50. *E. Bot. t.* 2567. *Lindenb. Syn. Hepat. p.* 73.

Rocks in heathy places, about Bantry, *Miss Hutchins.* Plentiful on detached rocks in the woods near Killarney, *Mr. Wilson;* always barren. —Mr. Wilson, to whom I am indebted for numerous specimens, observes that this is a good species, that the *leaves* have a thickened margin omitted in the *Brit. Jungermanniæ,* and the upper ones are appressed as in *J. compressa.*

5. J. *Doniána,* Hook. (*Donian Jungermannia*); stem erect subsimple flexuose, leaves closely imbricated patent oblongo-ovate concave bidentate at the point frequently falcato-secund, fruit terminal, perianth ovate laciniated. *Hook. Br. Jung. t.* 39. *E. Bot. t.* 2566. *Lindenb. Syn. Hepat. p.* 74.

Scottish mountains, rare; and almost wholly confined to moist rocks, among other *Jungermanniæ* and Mosses, in the elevated parts of the Clova and Cairngorm mountains. *Dr. Greville* has gathered it with *calyces,* but these are of very rare occurrence, and the fruit of this most distinct species is unknown.

6. J. *púmila,* With. (*dwarf simple Jungermannia*); stem ascending nearly simple, leaves elliptical oblong, fruit terminal, perianth oblongo-ovate acuminate plicate and contracted above, the mouth minute dentato-ciliate. *With. Bot. Arr. ed.* 3. *p.* 866. *t.* 18. *f.* 4. *E. Bot. t.* 2230. *Hook. Br. Jung. t.* 17. *Lindenb. Syn. Hepat. p.* 69.

Rocky beds of rivulets, in subalpine countries. *Fr.* June.—A small plant, with foliage of the colour and texture of *J. cordifolia.*

7. J. *lanceoláta,* Linn. (*lance-leaved Jungermannia*); stem procumbent nearly simple, leaves patent ovato-subrotund, fruit terminal, perianth oblong cylindrical depressed and plane at the top, the mouth contracted inciso-dentate. *Linn. Sp. Pl. p.* 1597. *Hook. Br. Jung. t.* 18. *Lindenb. Syn. Hepat. p.* 71.

Moist shady banks, and on trunks of trees. *Hudson, Withering, Lightfoot. Fr.* ——.—Of this I have never seen British specimens: and I suspect the authors just mentioned may have mistaken some other species for it. It is remarkable for the cylindrical, and, as it were, truncated summit of the *perianth,* and for the very minute contracted mouth.

8. J. *cordifólia,* Hook. (*heart-leaved Jungermannia*); stem erect flexuose dichotomous, leaves erect concave cordate cir-

cumvolute, fruit terminal and axillary, perianth oblongo-ovate subplicate, the mouth minute denticulated. *Hook. Br. Jung. t.* 32. *E. Bot. t.* 2590. *Hobs. Br. Mosses, v.* 2. *n.* 89. *Lindenb. Syn. Hepat. p.* 72.

Boggy places and in springs, in subalpine countries. *Fr.* ——.— The *capsules* are unknown to me, and the *perianths*, which are very rare, have been only found by *Mr. Lyell* in Angusshire, in August. The *leaves* are peculiarly soft and flaccid, of a dark lurid green, almost black when dry.

9. J. *Sphágni*, Dicks. (*Bog-Moss Jungermannia*); stem procumbent nearly simple (the gemmiferous elongations alone stipuled), leaves orbicular, fruit terminal on short proper branches, perianth oblong attenuated at each extremity, the mouth contracted denticulate. *Dicks. Cr. Fasc.* 1. *p.* 6. *t.* 1. *f.* 10. *E. Bot. t.* 2470. *Hook. Br. Jung. t.* 33, *and Suppl. t.* 2. *Hobs. Br. Mosses, v.* 2. *n.* 110. *Lindenb. Syn. Hepat. p.* 28.

Moist heathy places. *Fr.* Spring.— A very elegant and distinct species, sending out large radicles from nearly the whole length of the underside of its *stem*, by which it attaches itself to *Sphagnum* and other mosses.

10. J. *crenuláta*, Sm. (*crenulated Jungermannia*); stem procumbent branched, leaves orbicular margined frequently secund, fruit terminal, perianth obovate compressed 4-angled, the mouth much contracted toothed. *E. Bot. t.* 1463. *Hook. Br. Jung. t.* 37. *Lindenb. Syn. Hepat. p.* 66.

Moist heaths. *Fr.* Apr. — *Foliage* and *perianth* frequently tinged with purple. The large cellules at the edge of the leaves that constitute the margin which is so remarkable in this plant, are most observable, as Mr. Wilson remarks, in those leaves which are nearest the perianth.

11. J. *sphærocárpa*, Hook. (*round-fruited Jungermannia*); stem ascending simple, leaves orbicular, fruit terminal, perianth oblongo-ovate contracted and tubular at the mouth at length 4-cleft, capsule (when dry) globose. *Hook. Br. Jung. t.* 74. *Lindenb. Syn. Hepat. p.* 68.

Boggy places in the South of England, Wales, and Ireland. *Fr.* May. —According to Mr. Wilson's recent observations, this is a very variable plant; whose *perianth* becomes 4-fid or deeply 5-toothed, only after the emission of the *capsule;* and whose capsule seems to assume a sphærical form almost in every case after having been dried.

12. J. *hyalína*, Lyell, (*transparent Jungermannia*); stems ascending flexuose dichotomous, leaves roundish slightly waved, fruit terminal, perianth oblong angulate, mouth contracted 4-toothed. *Lyell in Hook. Br. Jung. t.* 63. *Hook. in E. Bot. Suppl. t.* 2678. *Lindenb. Syn. Hepat. p.* 67.

Boggy places, New Forest, Hants, and near Ambleside, *C. Lyell, Esq.* Lefing Mountain, near Dublin, *Dr. Taylor. Fr.* April.—There is a close affinity between *J. sphærocarpa, pumila*, and the present species.

13. J. *compréssa*, Hook. (*compressed upright Jungermannia*); stem erect branched, leaves orbicular the upper ones reniform

appressed, (stipules only upon the innovations,) fruit terminal, perianth immersed in the perichætial leaves oblong fleshy, the mouth open 4-toothed. *Hook. Br. Jung. t.* 38. *E. Bot. t.* 2587. *Lindenb. Syn. Hepat. p.* 33.

Mountain rivulets, Ireland, *Dr. Taylor.* Plentiful on Snowdon, *Mr. Wilson. Fr.* Apr.—June.—This has an almost equal claim to rank with the *stipulated* as with the *exstipulated* species; and among the former it is allied to *J. scalaris* and *Taylori.*

** *Leaves emarginate or bifid; the segments equal.*

14. J. *emarginàta,* Ehrh. (*notched Jungermannia*); stem erect branched, leaves loosely imbricated patent obcordate emarginate, fruit terminal, perianth ovate toothed immersed in the perichætial leaves. *Ehrh. Beitr.* 3. *p.* 80. *Hook. Br. Jung. t.* 27. *E. Bot. t.* 1022. *Hobs. Br. Mosses, v.* 2. *n.* 92. *Lindenb. Syn. Hepat. p.* 75.—*J. macrorhiza, Dicks. Cr. Fasc.* 2. *p.* 16. *t.* 5. *f.* 10.—*Sarcocyphos Ehrharti, Corda in Sturm Deutschl. Fl.*

Wet places, among rocks in the mountainous districts; frequent. *Fr.* March, June.—A well-marked and very distinct species, of a deep purple colour, almost black.

15. J. *concinnàta,* Lightf. (*braided Jungermannia*); stem erect branched, leaves very closely imbricated erect concave ovate obtuse emarginate, fruit terminal, perianth none, calyptra concealed by the perichætial leaves. *Lightf. Scot. v.* 2. *p.* 786. *E. Bot. t.* 1022. *Hook. Br. Jung. t.* 3. *Lindenb. Syn. Hepat. p.* 74. *Hobs. Br. Mosses, v.* 2. *n.* 88.—*Gymnomitrion concinnatum, Corda.*

Alpine rocks, especially those over which water occasionally trickles. *Fr.* June.—*Plants* densely matted, small, varying from a silvery hue to a pale yellowish-brown, sometimes nearly black.—Mr. Wilson says there are occasional appendages to the leaves, resembling stipules, of a lanceolate shape.

16. J. *Orcadénsis,* Hook. (*Orkney Jungermannia*); stem erect nearly simple, leaves closely imbricated erect or patent cordato-ovate the margins recurved. *Hook. Br. Jung. t.* 71. *Hobs. Br. Mosses, v.* 2. *n.* 102. *Lindenb. Syn. Hepat. p.* 74. *Hook. in E. Bot. Suppl. t.* 2679.

Mountains of Scotland, not uncommon, mixed with mosses; first discovered in Orkney. *Fr.* unknown; but *gemmæ* are found upon the points of the terminal *leaves.*

17. J. *infláta,* Huds. (*inflated Jungermannia*); stem erect simple or branched, leaves roundish concave acutely bifid minutely reticulated the segments very obtuse, those of the perichætium small, fruit terminal, perianth (frequently abortive and deciduous) oblong or pyriform, the mouth contracted toothed. *Huds. Angl. p.* 571. *Hook. Br. Jung. t.* 38. *E. Bot. t.* 2512. *Lindenb. Syn. Hepat. p.* 79.—*J. bicrenata, Schmid.*

Moist heaths. *Fr.* March, Apr.

18. J. *affínis*, Wils. (*pale reticulated Jungermannia*); stem procumbent simple or branched, leaves roundish concave acutely bifid coarsely reticulated the segments obtuse, those of the perichætium larger than the rest, fruit terminal, perianth (mostly fertile) pyriform plicate contracted and toothed at the mouth. *Wills. in E. Bot. Suppl. ined.*—*J. inflata, Hobs. Br. Mosses, n.* 93.

Frequent in limestone and marly districts, in moist or shady places under precipitous banks, Cheshire ; near Bangor ; and Woodlands near Dublin, *Mr. Wilson. Fr.* March, Apr. — The procumbent *stems*, large reticulation and less obtuse segments of the *leaves*, and above all the plicated upper portion of the *calyx*, have induced Mr. Wilson to distinguish this from the preceding.

19. J. *excísa*, Dicks. (*small notch-leaved Jungermannia*); stem prostrate nearly simple, leaves patent subquadrate deeply notched, fruit terminal, perianth oblong, the mouth plicated toothed. *Dicks. Cr. Fasc.* 3. *p.* 2. *t.* 8. *f.* 7. *Hook. Br. Jung. t.* 9. *E. Bot. t.* 2497. *Lindenb. Syn. Hepat. p.* 84.—*β. crispata ;* leaves longitudinally waved the segments unequal crisped. *Hook. Br. Jung. l. c.*

Moist banks in heaths and woods. *Fr.* Apr. May. — A minute species, often rendered more conspicuous by its numerous, diaphanous, comparatively large *perianths*, than by the foliage.

20. J. *ventricósa*, Dicks. (*tumid Jungermannia*); stem prostrate somewhat branched, leaves patent subquadrate bluntly emarginate the sides incurved, fruit terminal, perianth oblong, the mouth contracted plicate toothed. *Dicks. Cr. Fasc.* 2. *p.* 14. *E. Bot. t.* 2497. *Lindenb. Syn. Hepat. p.* 86.—*Dill. Musc. t.* 70. *f.* 14.

Shady woods and banks. *Fr.* (scarce) Nov. — Allied to the preceding, but larger and with differently shaped *perianths*. *Gemmæ* are very abundant on the tips of the upper leaves, where they form balls.

21. J. *Turnéri*, Hook. (*Turnerian Jungermannia*); stem procumbent flexuose branched in a stellated manner, leaves broadly ovate acutely bipartite, segments conduplicate spinuloso-dentate, fruit terminal, perianth linear-oblong longitudinally plicated. *Hook. Br. Jung. t.* 29. *E. Bot. t.* 2510. *Lindenb. Syn. Hepat. p.* 92.

Shady bank of a mountain rivulet, near Bantry, Ireland, *Miss Hutchins. Fr.* March. — A minute species, with the habit of *J. bicuspidata* ; and a no less beautiful than a rare one.

22. J. *bicuspidáta*, Linn. (*forked Jungermannia*); stem procumbent branched in a stellated manner, leaves subquadrate acutely bifid the segments acute straight entire, fruit radical, perianth linear-oblong longitudinally plicated, the mouth toothed. *Linn. Sp. Pl. p.* 1589. *E. Bot. t.* 2239. (*not* 281.) *Hook. Br. Jung. t.* 11. *Hobs. Br. Mosses, v.* 2. *n.* 84. *Lindenb. Syn. Hepat. p.* 89.—*Dill. Musc. t.* 70. *f.* 13.

Hedge-banks and moist heaths, frequent. *Fr.* March, Apr. — A delicate species, of a pale yellow-green colour, very cellular, the *leaves* remote, their segments sometimes patent. Balls of yellow *gemmæ* are produced at the extremities of the barren shoots, which soon dissolve, as it were, and disappear.

23. J. *byssácea*, Roth, (*Byssus-like Jungermannia*); stem procumbent branched in a stellated manner, leaves subquadrate obtusely bifid the segments acute, fruit terminal, perianth oblong plicate, the mouth toothed. *Roth, Cat. Bot. v.* 2. *p.* 158. *Hook. Br. Jung. t.* 12. *Lindenb. Syn. Hepat. p.* 78. — *J. divaricata, E. Bot. t.* 2463.

Heathy places, in dry and exposed situations. *Fr.* Apr. May. — A very minute species, and appearing, to the naked eye, like some byssoid or confervoid plant, rather than a *Jungermannia;* it is too of a dark brown *colour*, and its *fructification* is terminal, by which character it may be known from the preceding. Mr. Wilson has observed the *perianth* to be *double;* that is, an outer one is occasionally formed by the union of the perichætial leaves, as in *J. incisa* and some others.

24. J. *connívens*, Dicks. (*forcipated Jungermannia*); stem procumbent branched in a stellated manner, leaves orbicular concave with a lanceolate notch at the extremity, fruit terminal upon proper short central branches, perianth oblongo-ovate inflated, the mouth ciliated. *Dicks. Cr. Fasc.* 4. *p.* 19. *t.* 11. *f.* 15. *Hook. Br. Jung. t.* 15. *E. Bot. t.* 1304. *Lindenb. Syn. Hepat. p.* 91.

Wet bogs, particularly among *Sphagnum* and other semi-aquatic mosses. *Fr.* Apr. — This is beautifully distinguished from *J. bicuspidata*, with which it agrees in its mode of growth and texture, by the singular curvation of the segments of the *leaves* towards each other in a forceps-like manner, by the swollen, much ciliated *perianths*, and the more divided *perichætial leaves.*

25. J. *curvifólia*, Dicks. (*curve-leaved Jungermannia*); stem procumbent branched in a stellated manner, leaves roundish very concave deeply bifid the long acuminate segments singularly incurved, fruit terminal upon short proper central branches, perianth oblong subplicate, the mouth dentate. *Dicks. Cr. Fasc.* 2. *t.* 5. *f.* 7. *E. Bot. t.* 1304. *Hook. Br. Jung. t.* 16. *Lindenb. Syn. Hepat. p.* 91.

On moist rocks and decayed wood, in alpine districts. *Fr.* March. — *Leaves* generally tinged with purple.

*** *Leaves tri-quadrifid; the segments equal.*

26. J. *capitáta*, Hook. (*capitate Jungermannia*); stem prostrate nearly simple, leaves rotundato-quadrate the lower ones bifid the upper ones collected into a head and tri-quadrifid, fruit terminal, perianth oblongo-ovate subplicate, the mouth contracted toothed. *Hook. Br. Jung. t.* 80. *Lindenb. Syn. Hepat. t.* 92.

Cadnam bog and Lyndhurst Race-course, Hants, *C. Lyell, Esq.* Dry mountain rock, near Bantry, Ireland, *Miss Hutchins. Fr.* Spring. —

Very nearly allied to *J. excisa;* but the *foliage* has a much more loosely cellular texture (which also keeps it distinct from *J. incisa*), and the upper leaves, which, too, are tri-quadrifid, are collected into a head at the extremity of the stem or branch.

27. J. *incísa*, Schrad. (*jag-leaved Jungermannia*); stem prostrate nearly simple, leaves rotundato-quadrate waved trifid the segments unequal here and there toothed, fruit terminal, perianth obovate. *Schrad. Samml. 2. p. 5. Hook. Br. Jung. t.* 10. *E. Bot. t.* 2528. *Lindenb. Syn. Hepat. p.* 93.

Wet bogs. *Fr.* Winter and Spr. — A minute species, like the preceding, with *foliage* of a pale delicate green, densely crowded, waved and cut, and with thickened and compressed *stems*. *Fruit* rare. *Gemmæ* copious, collected into little balls on the points of the leaves.

28. J. *pusílla*, Linn. (*dwarf Jungermannia*); stem procumbent nearly simple, leaves horizontal quadrate waved large irregularly 2—3-fid, fruit terminal, perianth campanulate, the mouth much spreading waved and cut, capsule globose bursting irregularly. *Linn. Sp. Pl. p.* 1602. *E. Bot. t.* 1175. *Hook. Br. Jung. t.* 69. *Hobs. Br. Mosses, v. 2. n.* 105. *Lindenb. Syn. Hepat. p.* 94.— *J. angulosa, Dicks.—J. Wondraczelci, Corda in Sturm Deutschl. Fl. cum Ic.— Dill. Musc. t.* 71. *f.* 22, *C, D, E, and t.* 74. *f.* 46.

Moist shady banks, especially on clay. *Fr.* Aut. and Spr. — This species is quite peculiar. Its short and stout *stems* are furnished with long purple *radicles* for the whole length of their underside. *Leaves* large in proportion to the size of the plant and closely set, spreading. *Anthers*, as they are called, are found naked upon the stems. The *perianth* is singularly large, campanulate, often cut, with 4—5 external subulate appendages or bracteas. The *capsule* is globose, of a very thin and fragile texture, bursting irregularly and containing *seeds* which are densely muricated. Sometimes 2 or 3 capsules arise from the same calyx.

**** Leaves bifid, the segments unequal, conduplicate.*

29. J. *nemorósa*, Linn. (*wood Jungermannia*); stem erect subdichotomous, leaves unequally 2-lobed dentato-ciliate, lobes conduplicate the lower ones larger obovate the upper ones subcordate obtuse, fruit terminal, perianth oblong incurved compressed, the mouth truncated dentato-ciliate. *Linn. Sp. Pl. p.* 1598. *E. Bot. t.* 607. *Hook. Br. Jung. t.* 21. *Hobs. Br. Mosses, v. 2. n.* 101.—*J. resupinata, E. Bot. t.* 243. *Lindenb. Syn. Hepat. p.* 51.—*Dill. Musc. t.* 71. *f.* 19.—*β. purpurascens. J. cochleariformis, With.—Dill. Musc. t.* 71. *f.* 21.—*γ. recurvifolia, Hook. Br. Jung. l. c.* — *λ. denudata;* lobes of the leaves nearly entire. *Hook. Br. Jung. l. c.*

Woods and among rocks, especially in alpine situations. *Fr.* April, May.

30. J. *planifólia*, Hook. (*flat-leaved Jungermannia*); stem erect nearly simple, leaves bipartite, lobes unequal dentato-ciliate conduplicate the lower ones larger ovate the upper ones cordate. *Hook. Br. Jung. t.* 67, *et in E. Bot. Suppl. t.* 2695. —*J. nemorosa, δ. Lindenb. Syn. Hepat. p.* 52.

Moist rocky places, Ben a bord and Ben y mac Duich, Scotland, *Mr. Don*, (at which latter place *Mr. Arnott* and myself gathered it abundantly in 1830, growing with *J. Doniana.*) Summit of Brandon mountain, Ireland, *Dr. Taylor.* Cwm Idwel, N. Wales, *Mr. Wilson.* *Fr.* unknown. — The lobes of the *leaf* are, in this remarkable species, separated nearly to the base, so that they may be said to form distinct leaves. This species has been observed by Mr. Wilson to have a very fetid smell, resembling Castor, giving out its odour while drying and on being again moistened. The plant and its foliage are among the largest of this group, and of a yellowish-brown colour.

31. J. *umbrósa,* Schrad. (*shady Jungermannia*); stem nearly erect somewhat branched, leaves unequally lobed the lobes conduplicate their apices serrated acute, the upper ones roundish-ovate the lower ones larger ovate, fruit terminal, perianth oblong incurved compressed, the mouth truncated entire. *Schrad. Samml. 2. p. 5. Hook. Br. Jung. t. 24. E. Bot. t. 2527. Lindenb. Syn. Hepat p. 57.*

Rocks in Scotland, Ireland, and at Llyn Ogwen, N. Wales. (*Mr. Wilson.*) *Fr.* March, April. — Considerably smaller than the two preceding, and serrated only at the extremity of the *leaves.*

32. J. *unduláta,* Linn. (*wavy-leaved Jungermannia*); stem erect dichotomous, leaves unequally lobed waved the lobes conduplicate roundish entire or very obscurely crenulated, the lower ones much larger, fruit terminal, perianth oblong incurved compressed, the mouth truncated entire or nearly so. *Linn. Sp. Pl. p. 1598. E. Bot. t. 2251.* (the fructified specimens appear to belong to *J. scalaris.*) *Hook. Br. Jung. t. 22. Hobs. Br. Mosses, v. 2. n. 116. Lindenb. Syn. Hepat. p. 56. — J. purpurea E. Bot. t. 1023.* (excluding the figure on the left-hand side of the plate, which belongs to *J. albicans.*)

Wet places, among rocks in streams and in springs, alpine countries, abundant. *Fr.* May.

33. J. *resupináta,* Linn. (*curled Jungermannia*); stem procumbent nearly simple, leaves roundish almost equally 2-lobed entire the lobes conduplicate, fruit terminal, perianth oblong incurved compressed, the mouth truncated denticulate. *Linn. Sp. Pl. p. 1598. Hook. Br. Jung. t. 23. E. Bot. t. 2498. Lindenb. Syn. Hepat. p. 53.*

Banks and in woods. *Fr.* Spring. — Much smaller than the last, with procumbent *stems,* and nearly equal concave conduplicate but closely appressed lobes of the *leaves.*

34. J. *álbicans,* Linn. (*whitish Jungermannia*); stem erect slightly divided, leaves unequally 2-lobed the lobes conduplicate with a pellucid line in the middle serrated at the point the upper ones oblongo-ovate acute the lower ones larger somewhat scymitar-shaped, fruit terminal, perianth obovate cylindrical subcompressed, the mouth contracted plicate toothed. *Linn. Sp. Pl. p. 1599. E. Bot. t. 2240.* and *t. 1023.* (the left-hand figure.) *Hook. Br. Jung. t. 25. Hobs. Br. Mosses, v. 2. n. 82. Lindenb. Syn. Hepat. p. 67. — J. varia, Linn. Sp. Pl. p. 1601. —*

Dill. Musc. t. 71. *f.* 20, and *t.* 73. *f.* 36. — *β. procumbens;* stem procumbent, leaves nearly erect.

Moist banks, especially in a loamy soil, abundant. *Fr.* March, Apr.

35. J. *obtusifólia*, Hook. (*blunt-leaved Jungermannia*); stem ascending simple, leaves unequally 2-lobed the lobes conduplicate obtuse entire, the upper ones oblong obtuse the lower ones large somewhat scymitar-shaped, perianth obovate, the mouth contracted toothed. *Hook. Br. Jung. t.* 26. *E. Bot. t.* 2511. *Lindenb. Syn. Hepat. p.* 60.

Near Heddon on the Wall, Northumberland, *Mr. Thornhill.* Near Bantry, Ireland, *Miss Hutchins.* Duncombe wood, near Cork, and Delamere Forest, Cheshire, *Mr. Wilson. Fr.* Apr. May. — Much smaller than the last, with more obtuse entire lobes, destitute of the pellucid line, and with *perianths* not at all compressed. *Colour* a pale pleasant green.

36. J. *Dicksóni*, Hook. (*Dicksonian Jungermannia*); stem ascending nearly simple, leaves unequally lobed the lobes conduplicate narrow ovate entire acute the lower ones larger, fruit terminal, perianth ovate plicate, the mouth contracted toothed. *Hook. Br. Jung. t.* 48. *E. Bot. t.* 2591. *Hobs. Br. Mosses, v.* 2. *n.* 90. *Lindenb. Syn. Hepat. p.* 62.

Scotland, *Mr. Dickson.* Castle hill, Kinnordy; and Kerriemuir, Angus, *C. Lyell, Esq.* Mountains, near Dublin, *Dr. Taylor. Fr.* August.

37. J. *minúta*, Crantz, (*small neat Jungermannia*); stem erect nearly dichotomous, leaves horizontally patent subconduplicate the upper ones equally the lower ones unequally 2-lobed all rather acute, fruit terminal, perianth obovate a little plicate at the extremity, the mouth contracted denticulate. *Crantz, Hist. Greenl. p.* 288. *Dicks. Cr. Fasc.* 2. *p.* 13. *Hook. Br. Jung. t.* 44. *Hobs. Br. Mosses, v.* 2. *n.* 98. *E. Bot. t.* 2231. *Lindenb. Syn. Hepat. p.* 62.—*Dill. Musc. t.* 69. *f.* 2.

Alpine rocks, not unfrequent. *Fr.* (rare) Spr. and Sum. — A small, but remarkably neat growing plant, of a reddish-brown colour, with the *leaves* arranged in a very regular manner. Red *gemmæ* are found in loose clusters, at the extremity of the foliage, in summer.

38. J. *exsécta*, Schmid. (*notch-leaved Jungermannia*); stem prostrate nearly simple, leaves ovato-lanceolate concave the lobes very unequal acute subconduplicate the lower one a sharp tooth, the apex of the larger one often two-toothed. *Schmid. Ic. p.* 241. *t.* 62. *f.* 2. *Hook. Br. Jung. t.* 19. *Lindenb. Syn. Hepat. p.* 64.

Boggy heaths and moors, in England and the South of Ireland. *Fr.* unknown. — This is a small and very curious species, differing in the structure of its *leaves* (as do the two following) from the rest of their division: — Though unequally and sharply two-lobed, the lobes can hardly be said to be conduplicate. The *fructification* has never been detected, but balls of bright red *gemmæ* crown the tips of the upper *leaves* and render this minute plant very conspicuous.

39. J. *cochleariformis*, Weis, (*hollow-leaved Jungermannia*);

stem procumbent nearly simple, leaves imbricated above unequally two-lobed conduplicate the upper lobes larger convex bifid and serrated at the point the lower oblongo-ovate saccate. *Weis, Pl. Crypt. p.* 123. *E. Bot. t.* 2500. *Hook. Br. Jung. t.* 68. *Hobs. Br. Mosses, v.* 2. *n.* 87. *Lindenb. Syn. Hepat. p.* 50. —*J. purpurea, Scop.*—*Lightf. Scot. v.* 2. *p.* 778.—*Mnium Jungermannia, Linn. Sp. Pl. p.* 1579.—*Dill. Musc. t.* 69. *f.* 1. *C, D, E.*

Moist moors and among rocks, Ireland and the Highlands of Scotland, particularly in the north, not unfrequent. *Fr.* unknown.—4—6 inches long, of a rich purple colour, growing in large tufts. The nearest affinity of this species is the *J. sphagnoides* of St. Helena.

40. J. *complanáta,* Linn. (*flat Jungermannia*); stem creeping vaguely branched, leaves distichous imbricated above unequally 2-lobed the upper lobes larger orbicular, the lower ones ovate appressed plane, fruit terminal, perianth oblong compressed truncate. *Linn. Sp. Pl. p.* 1133. *E. Bot. t.* 2499. *Hook. Br. Jung. t.* 81. *Hobs. Br. Mosses, v.* 1. *n.* 112. *Lindenb. Syn. Hepat. p.* 50.—*Dill. Musc. t.* 72. *f.* 26.

Trunks of trees, frequent. *Fr.* throughout the year.—This forms pale green, nearly orbicular patches, closely pressed on the bark of trees. In habit, allied to *J. platyphylla* and *dilatata;* but destitute of *stipules.*

B. *Stipulate.*

a. *Leaves entire or rarely emarginate.*

41. J. *anómala,* Hook. (*various-leaved Jungermannia*); stem procumbent simple, leaves orbicular roundish-ovate and ovato-acuminate with large reticulations, stipules broadly subulate. *Hook. Br. Jung. t.* 24. *E. Bot. t.* 2518. *Lindenb. Syn. Hepat. p.* 25.

Bogs, not unfrequent. *Fr.* unknown.—*Gemmæ* are found in small balls, at the apex of the upper *leaves,* especially in autumn: and indeed *Mr. Wilson* considers this as only a gemmiferous *variety* of the following species, in which opinion he is probably right; the very large reticulation of the foliage being common to both, while the chief character of the present lies in its ovate superior *leaves.*

42. J. *Taylóri,* Hook. (*Taylorian Jungermannia*); stem erect nearly simple, leaves all of them nearly orbicular with large reticulations, stipules broadly subulate, fruit terminal, perianth ovate compressed at the mouth truncated and 2-lipped. *Hook. Br. Jung. t.* 56. *et in E. Bot. Suppl. t.* 2691. *Hobs. Br. Mosses, v.* 2. *n.* 113. *Lindenb. Syn. Hepat. p.* 26.

Moist rocks and boggy places in alpine districts. *Fr.* Spring.—This species is extremely beautiful, of a rich purple colour, with reticulations so large, that, when the plant is dry from the collapsing of the cells, its *leaves* have, even to the naked eye, a distinctly dotted appearance.

43. J. *scaláris,* Schrad. (*ladder Jungermannia*); stem creeping simple, leaves roundish concave entire and emarginate, stipules broadly subulate, fruit terminal, perianth combined with the

perichætial leaves. *Schrad. Samml.* 2. *p.* 4. *Hook. Br. Jung. t.* 61. *Hobs. Br. Mosses, v.* 2. *n.* 107. *Lindenb. Syn. Hepat. p.* 26.—*J. lanceolata, E. Bot. t.* 605.

Hedge-banks and barren wastes, frequent. *Fr.* March, Apr.—A minute, black, muricated, fungous-like body infests the leaves of this and some other species of *Jungermannia:* "It contains about 15 oblong granules, on rather long pedicels, attached to a determinate portion of the inner surface of the Fungus, one of the hemisphærical portions (after a section is made) being quite free from them." *Wils.*

44. J. *polyánthos,* Linn. (*many-flowered Jungermannia*); stem procumbent somewhat branched, leaves horizontal roundish quadrate plane entire and emarginate, stipules oblong bifid, fruit on short proper branches from the underside of the stem, perianth half the length of the calyptra 2-lipped laciniated. *Linn. Sp. Pl. p.* 1597. *E. Bot. t.* 2479. *Hook. Br. Jung. t.* 62. *Lindenb. Syn. Hepat. p.* 30.—*Dill. Musc. t.* 69. *f.* 7, 8, *and t.* 70. *f.* 9.

Moist and very wet places, not unfrequent. *Fr.* March, Apr.—The very square *leaves* and peculiar *fructification* will always distinguish this species.

45. J. *cuneifólia,* Hook. (*wedge-leaved Jungermannia*); stem creeping simple, leaves rather remote cuneiform entire or very obtusely notched at the extremity, stipules minute ovate bifid. *Hook. Br. Jung. t.* 64. *et in E. Bot. Suppl. t.* 2700. *Lindenb. Syn. Hepat. p.* 33.

Parasitic on *J. Tamarisci,* near Bantry, Ireland, *Miss Hutchins. Fr.* unknown.—This curious and exceedingly minute plant is of a dingy brown colour, and scarcely visible to the naked eye.

46. J. *viticulósa,* Linn. (*straggling flat Jungermannia*); stem procumbent branched, leaves horizontal plane ovate entire, stipules broadly ovate dentato-laciniate, fruit dorsal, perianth subterraneous oblong fleshy, the mouth fimbriated with foliaceous scales. *Linn. Sp. Pl. p.* 1597. *E. Bot. t.* 2513. *Hook. Br. Jung. t.* 60. *Lindenb. Syn. Hepat. p.* 28.

In woods and rocky places, among mosses; especially in alpine countries. *Fr.* Apr.—In the fleshy subterraneous *perianth,* and in habit too, this and the following species recede from all the other *Jungermanniæ. Leaves* of a firm texture, yellow or tawny-green.

47. J. *Trichómanis,* Dicks. (*Fern Jungermannia*); stem creeping nearly simple, leaves horizontal convex ovate entire or emarginate, stipules roundish lunulately emarginate, fruit dorsal, perianth subterraneous oblong fleshy hairy, the mouth crenated. *Dicks. Cr. Fasc.* 3. *t.* 8. *f.* 5. *E. Bot. t.* 1875. *Hook. Br. Jung. t.* 79. *Hobs. Br. Mosses, v.* 2. *n.* 114. *Lindenb. Syn. Hepat. p.* 32.—*J. scalaris, Schmid. Diss. de Jung. p.* 20. *f.* 17 *and* 18.—*J. fissa, Scop.*—*Lightf.*—*J. sphærocephala, With.*—*Mnium Trichomanis, Linn. Sp. Pl. p.* 1579.—*M. fissum, ejusd. p.* 1579.—*Dill. Musc. t.* 31. *f.* 5, 6.

Moist ground, in heaths, woods and in marshes. *Fr.* Spr. and Sum.

— The *leaves* are of a singularly glaucous hue, with large cellules. *Capsule* linear-oblong ; its *valves* spirally twisted. *Gemmæ* are produced in little balls at the extremity of leafless prolongations of the stem. Hence *Linnæus* referred the plant to his *Mnium*.

b. *Leaves bi-tri-fid or-partite, the segments equal.*

* *Stipules much smaller than and very distinct from the leaves.*

48. J. *bidentáta*, Linn. (*triangular-sheathed Jungermannia*) ; stem procumbent branched, leaves broadly ovate decurrent bifid at the apex the segments very acute entire, stipules bi-trifid and laciniated, fruit terminal, perianth oblong subtriangular, the mouth laciniated. *Linn. Sp. Pl. p.* 1598. *E. Bot. t.* 606, *and t.* 281, (under the name of *J. bicuspidata*). *Hook. Br. Jung. t.* 30. *Hobs. Br. Mosses, v.* 2. *n.* 85.—*Lindenb. Syn. Hepat. p.* 41. *Dill. Musc. t.* 70. *f.* 11—*β. obtusata;* leaves bluntly emarginate dark green, stipules multifid. *Hook. Br. Jung. l. c.*

Moist and shady situations, on hedge-banks, particularly among moss and the roots of trees. *β.* In very wet parts of Holt Heath, Norfolk, *Rev. R. B. Francis. Fr.* Winter and Spr. — This *Jungermannia* (as well as some others) has a peculiarly agreeable scent, which may perhaps best be compared to that of the dry earth suddenly moistened by a shower. *Colour* a pale and whitish green.

49. J. *heterophýlla*, Schrad. (*various-leaved Jungermannia*) ; stem creeping branched, leaves roundish ovate decurrent the extremity rarely acutely generally obtusely emarginate or entire, stipules bi-quadrifid here and there laciniated, fruit terminal, perianth ovate obtusely triangular, the mouth laciniated. *Schrad. in Journ. Bot. 5. p.* 66. *Hook. Br. Jung. t.* 31. *Lindenb. Syn. Hepat. p.* 42.—*Dill. Musc. t.* 70. *f.* 12.

Moist places, upon decaying wood and at the foot of Alders, rarely among rocks. *Fr.* Winter and Spring. — Mr. Wilson has occasionally found two *germens* in the same calyx.

50. J. *scutáta*, Web. et Mohr, (*scutate Jungermannia*); stem procumbent simple, leaves rounded acutely emarginate at the apex, the segments acute straight, stipules large ovate acuminate with a tooth near the base at the margin on each side, fruit lateral, perianth obovate subplicate at the apex, the mouth contracted bluntly toothed. *Web. et Mohr, Cr. Germ. p.* 408. *Lindenb. Syn. Hepat. p.* 38.—*J. stipulacea, Hook. Br. Jung. t.* 41. *E. Bot. t.* 2356.

Shady rocks in the South of Ireland, *Miss Hutchins.* Scotland, *Mr. Don. Mr. Wilson* finds it near Turk Cascade, Killarney (but rare,) and near Llanberis, N. Wales. *Fr.* June. — A minute species. Mr. Wilson observes the *calyx* to be somewhat triangular, and the *stipules* and *leaves* to be larger on the top of the stem than elsewhere.

51. J. *Francísci*, Hook. (*Holt Jungermannia*) ; stem nearly erect simple or branched, leaves ovate concave acutely emarginate, stipules minute ovate bifid, fruit terminal upon short proper branches, perianth oblongo-cylindrical a little plaited, the

mouth toothed. *Hook. Br. Jung. t.* 49. *E. Bot. t.* 2565. *Lindenb. Syn. Hepat. p.* 40.

Moist boggy ground. First found at Holt and Edgefield, Norfolk, by *Rev. R. B. Francis.* In Suffolk. New Forest, Hants, *C. Lyell, Esq.* Delamere forest, Cheshire, *Mr. Wilson.* About Bantry, Ireland, *Miss Hutchins. Fr.* Spr. and Sum. — *Stems* among the most minute of the stipulated species: *leaves* of a purplish tinge; those of the *perichætium* often united, so as to form an outer perianth. *Wils.*

52. J. *barbáta*, Schreb. (*toothed Jungermannia*); stem procumbent nearly simple, leaves rotundato-quadrate tri-quadrifid, stipules lanceolate acutely bifid or bipartite and laciniated, fruit terminal, perianth ovate, the mouth contracted toothed. *Schreb. Spicil. Fl. Lips. p.* 107. *Hook. Br. Jung. t.* 70. *Hobs. Br. Mosses, v.* 2. *n.* 83. — *J. quinquedentata, Huds. Angl. p.* 511. *Linn. Sp. Pl. p.* 1598. *E. Bot. t.* 2517. *Lindenb. Syn. Hepat. p.* 45. — *Dill. Musc. t.* 71. *f.* 22, 23. — β. *minor;* stem ascending elongated at the extremity, upper leaves closely imbricated and secund gemmiferous. *Hook. Br. Jung. l. c.*

Rocks, woods and heathy places, abundant; especially in alpine districts. — β. in similar situations. *Fr.* Apr. — Perhaps the *var.* β. ought rather to be considered as the gemmiferous state of the plant, than as a *var.* The *stipules* are often obsolete in the lower part of the *stem.*

53. J. *albéscens*, Hook. (*small pale Jungermannia*); stem creeping branched, leaves very concave almost hemisphærical emarginate, stipules ovato-lanceolate obtuse, fruit terminal on short branches, perianth oblongo-ovate, the mouth toothed. *Hook. Br. Jung. t.* 82, *and Suppl. t.* 4. *Hobs. Br. Mosses, v.* 2. *n.* 81. *Lindenb. Syn. Hepat. p.* 38.

Rocky places on the summit of Ben Nevis, Scotland. *Fr.* ——. Of this small, but very distinct species, I have seen *fructification* only on Swiss specimens, gathered at a great elevation on the Grimsel. *Colour* pale green: *cellules* large.

54. J. *réptans*, Linn. (*creeping Jungermannia*); stem creeping stellatedly branched, leaves imbricated on the upper side subquadrate incurved acutely quadridentate, stipules broadly quadrate quadridentate, fruit dorsal, perianth oblong plicate, the mouth toothed. *Linn. Sp. Pl. p.* 1599. *E. Bot. t.* 608. *Hook. Br. Jung. t.* 65. *Hobs. Br. Mosses, v.* 2. *n.* 106. *Lindenb. Syn. Hepat. p.* 44. — *Dill. Musc. t.* 71. *f.* 24. — β. *bipinnata;* much larger, regularly bipinnate. *Hook. Br. Jung. l. c.*

Woods and shady places, frequent. β. Ireland; Lough Bray, *Mr. Turner;* Bantry, *Miss Hutchins;* rocky woods near Killarney, where the usual state of the plant is rarely to be found, *Mr. Wilson. Fr.* Spr. and Sum. — Often bearing flagellæ with small *leaves*, and in that, as well as in many other particulars, allied to *J. trilobata.* It is however much smaller, of a very lax cellular texture and pale green colour.

55. J. *trilobáta*, Linn. (*three-toothed Jungermannia*); stem creeping flexuose branched, leaves imbricated on the upper side ovate convex obtusely tridentate at the point, stipules broadly subquadrate crenate, fruit dorsal, perianth oblong subacuminate,

the mouth cleft on one side. *Linn. Sp. Pl. p.* 1599. *Hook. Br. Jung. t.* 76. *Hobs. Br. Mosses, v.* 2. *n.* 115. *Lindenb. Syn. Hepat. p.* 43.—*β. minor;* much smaller in all its parts.—*Hook. Br. Jung. l. c.*—*γ. minima;* very minute, leaves indistinct or remote often bidentate or entire. *Hook. Br. Jung. l. c.*

Moist alpine spots, among rocks, frequent. *β.* in more elevated situations. *γ.* South of Ireland, *Miss Hutchins. Fr.* ——.—The larger state of this plant is very handsome and easily recognized by the above characters and its numerous almost leafless *flagellæ*. Abortive *fructification* has been found by Mr. Wilson at Killarney, on the 2 first *varieties*. Perfect fruit I have only seen on continental specimens. It is dorsal in its origin, as is the case with *J. viticulosa, reptans, Trichomanis*, &c.

** *Stipules as large as the leaves or nearly so, and easily confounded with them.*

56. J. *juniperína*, Sw. (*Juniper-leaved Jungermannia*); stem erect flexuose nearly simple, leaves and stipules linear-lanceolate bipartite falcato-secund, fruit terminal, perianth ovate laciniated bearing the perichætial leaves. *Sw. Fl. Ind. Occ. p.* 1855.—*β. europæa;* segments of the leaves straight. *Hook. Br. Jung. t.* 4. *Hobs. Br. Mosses, v.* 2, *n.* 95. *E. Bot. t.* 2443. *Lindenb. Syn. Hepat. p.* 35.—*J. adunca, Dicks. Cr. Fasc. p.* 12. *t.* 8. *f.* 1.

β. Among rocks, on the mountains of Scotland and Ireland. Welsh mountains. *Fr* ——.—Habit almost that of an *Andræa*, 3—5 or 6 inches tall. *Calyx*, which itself seems formed of united *perichætial leaves*, concealed by other leaves which arise from it. *Setæ* very short. The *fruit* is exceedingly scarce on European specimens. The West Indian state of the plant, larger and with spreading segments to the leaves, is not unfrequently found in *fr.* in Jamaica.

57. J. *julácea*, Linn. (*silvery alpine Jungermannia*); stem nearly erect branched filiform, leaves and stipules ovate closely imbricated erect deeply and acutely bifid, those of the perichætium quadripartite the segments lanceolate acuminate subserrated erect, fruit terminal, perianth oblong plicated upwards, the mouth open toothed. *Linn. Sp. Pl. p.* 1601. *E. Bot. t.* 1024. *Hook. Br. Jung. t.* 2. *Hobs. Br. Mosses, v.* 2. *n.* 94. *Lindenb. Syn. Hepat. p.* 35.—*Dill. Musc. t.* 73. *f.* 38.

Abundant on the ground and on rocks, in the high mountains. *Fr.* June, July.—This is altogether an alpine species, of small size, but growing in very dense compact tufts, often rendered conspicuous by a silvery white hue, which appears to be occasioned by a kind of bloom on their surface.

58. J. *laxifólia*, Hook. (*lax-leaved Jungermannia*); stem erect nearly simple filiform, leaves and stipules remote erecto-patent ovate subcarinate acutely bifid with acute erect segments, those of the perichætium similar, fruit terminal, perianth oblong subplicate, the mouth contracted toothed. *Hook. Br. Jung. t.* 59. *E. Bot. Suppl.* 2677. *Lindenb. Syn. Hepat. p.* 34.

Mountain rivulet near Bantry, *Miss Hutchins;* and in a stream near Castle-Kelly mountain, Wicklow, *Dr. Taylor. Fr.* Apr.—This, with much of the habit of *J. julacea*, has lax foliage, of a pale green colour, with large cellules and different *perichætial leaves*.

59. J. *setácea*, Web. (*bristly Jungermannia*); stem creeping somewhat pinnatedly branched, leaves and stipules deeply bipartite the segments (short) setaceous jointed confervoid patent incurved, fruit terminal upon short proper branches, perianth oblong, mouth open ciliated. *Weber, Spicil. p.* 155. *Hook. Br. Jung. t.* 8. *E. Bot. t.* 2482. *Hobs. Br. Mosses, v.* 2. *n.* 109. *Lindenb. Syn. Hepat. p.* 35. *J. multiflora, Huds.—J. sertularioides, Linn. Suppl.—J. pauciflora, Dicks. Cr. Fasc.* 2. *p.* 15. *t.* 3. *f.* 9.—*Dill. Musc. t.* 69. *f.* 4. *A. B.*?

Bogs and moist ground, in shady places, and upon decayed stumps of trees. *Fr.* Oct. Nov.— This and the following species are so peculiar in the confervoid structure of their foliage, that they cannot be confounded with any other.

60. J. *trichophýlla*, Linn. (*hairy Jungermannia*); stem creeping irregularly branched, leaves and stipules deeply 3—4 partite the segments setaceous sometimes fascicled jointed patent straight, fruit terminal, perianth oblong, the mouth contracted ciliated. *Linn. Sp. Pl. p.* 1601. *E. Bot. t.* 2252. *Hook. Br. Jung. t.* 7. *Lindenb. Syn. Hepat. p.* 35.—*Dill. Musc. t.* 73. *f.* 37.

Turfy heaths, in moist and shady situations, chiefly in mountainous countries. *Fr.* June.

61. J. *setifórmis*, Ehrh. (*four-lobed Jungermannia*); stem erect nearly simple, leaves bifarious closely imbricated erect quadripartite the margins reflexed more or less spinuloso-dentate, stipules bipartite, fruit terminal, perianth oblong plicate, the mouth open. *Hook. Br. Jung. t.* 20.—*α. lapponica;* segments of the leaves spinuloso-dentate. *J. setiformis, Ehrh. Band.* 3. *p.* 40. —*Lindenb. Syn. Hepat. p.* 49.—*J. concatenata, Linn. Lapp.* (*cura Sm.*) *p.* 343.—*β. Britannica;* leaves smaller their segments entire. *Hook. Br. Jung. l. c.*

β. Elevated mountains of Clova and Cairngorm: upon rocks. *Fr.* ——. — Mr. Wilson has satisfied me that the present, as well as the five preceding species, is really furnished with *stipules*. It is extremely unlike any other in its essential characters, and the *var. β.* (and that, never in fructification) has alone been found in Britain. The *var. α.*, with calyces and young capsules, I have figured in the *Br. Jung.* from Linnæus's own specimens. This species grows in dense soft tufts of a yellow-green colour.

c. *Leaves bifid, lobes unequal conduplicate.*

* *Lower or smaller segments plane.*

62. J. *platyphýlla*, Linn. (*flat-leaved Jungermannia*); stem procumbent pinnatedly branched, leaves unequally 2-lobed the upper lobes roundish-ovate nearly entire, the lower ones and stipules ligulate entire, fruit lateral, perianth ovate compressed, the mouth truncated inciso-serrate cleft on one side. *Linn. Sp. Pl. p.* 1600. *E. Bot. t.* 798. *Hook. Br. Jung. t.* 40., *and Suppl. t.* 3. *Hobs. Br. Mosses, v.* 2. *n.* 103.—*β. major;* vaguely pinnatedly branched, leaves larger glossy yellow-green. *Lindenb. Syn. Hepat. p.* 18.—*γ. Thuya;* stem elongated simply pinnatedly

branched, leaves glossy brownish. *J. Thurga, Dicks. Cr. Fasc.* 4. *p.* 19. *Dill. Musc. p.* 72. *f.* 33.

Walls, rocks and trunks of trees, abundant. β. near Bantry, Ireland. *Miss Hutchins.* — γ. by Lochness in Scotland, *A. Menzies, Esq.*, and north of Ireland, *Mr. Templeton.* — Another *var.* Mr. Wilson finds near the Dargle, Ireland, with the larger *lobe* quadrate, resembling the leaf of *J. polyanthos*, and the lesser one very small.

63. J. *lævigáta*, Schrad. (*smooth-leaved Jungermannia*); stem procumbent vaguely bipinnate, leaves unequally 2-lobed spinuloso-dentate, upper lobes roundish-ovate the lower ones ligulate, the stipules oblongo-quadrate spinuloso-dentate. *Schrad. Samml.* 2. *p.* 6. *Hook. Br. Jung. t.* 35. *Hobs. Br. Mosses, v.* 2. *n.* 96. *Lindenb. Syn. Hepat. p.* 18.

Among rocks, in the alpine parts of Scotland and Ireland. *Fr.* unknown. — This plant, Mr. Wilson thinks, may fairly be united with the preceding; from which it differs only by the characters above given.

64. J. *ciliáris*, Linn. (*ciliated Jungermannia*); stem procumbent pinnatedly branched, leaves very convex unequally 2-lobed the lobes and lobules ovate bipartite with long slender cilia, fruit lateral, perianth obovate, the mouth contracted toothed. *Linn. Sp. Pl. p.* 1601. *Dicks. Cr. Fasc.* 2. *p.* 14. *E. Bot. t.* 2214. *Hook. Br. Jung. t.* 65. *Lindenb. Syn. Hepat. p.* 19.—*J. pulcherrima, Web.*—*Dicks. Cr. Fasc.* 1. *p.* 7.—*Dill. Musc. t.* 69. *f.* 3.

Heaths and rocks, especially in subalpine countries, frequent. *Fr.* ——. — This beautiful species has never, so far as I am aware, been seen with *capsules* in this country. Even the *calyces* are rare. *Mr. Wilson* finds specimens with them, near the top of Carnedd Llewelyn, N. Wales.

65. J. *Woódsii*, Hook. (*Mr. Wood's Jungermannia*); stem procumbent bi-tripinnate, leaves very convex unequally 2-lobed the upper lobes bipartite spinuloso-dentate the lower ones very minute oblong nearly entire, stipules large ovate bipartite spinuloso-dentate with the base spurred on each side. *Hook. Br. Jung. t.* 66, *et in E. Bot. Suppl. t.* 2668. *Lindenb. Syn. Hepat. p.* 20.

Mountains in the S. W. of Ireland; first found by *J. Woods, Esq.* on the ascent of Mangerton from Cwm na Capel. In great abundance at Brandon mountain, *Dr. Taylor. Fr.* unknown.—Allied to the last, but a larger and slenderer plant, with *leaves* toothed and laciniated, but not ciliated, and cellules placed wide apart.

66. J. *tomentélla*, Ehrh. (*spongy Jungermannia*); stem suberect bipinnate, leaves nearly plane unequally 2-lobed capillari-multifid, upper lobes bipartite the lower ones minute, stipules subquadrate laciniated, fruit axillary, perianth oblong cylindrical hairy, the mouth open. *Ehrh. Beitr.* 2. *p.* 150. *Dicks. Cr. Fasc.* 2. *p.* 14. *E. Bot. t.* 2242. *Hook. Br. Jung. t.* 36. *Hobs. Br. Mosses, v.* 1. *n.* 113. *Lindenb. Syn. Hepat. p.* 19.—*Dill. Musc. t.* 73. *f.* 35.

Plentiful in moist places, in various parts of the south-west and north of England as well as in Scotland and Ireland: yet by no means of

general occurrence. At Allan's Ford, near Durham, *Mr. Thornhill* used to say he could have loaded a cart with it. *Fr.* rare, March, (*Dill.*) Apr. to June, (at Cotteral wood, Cheshire), *Mr. Wilson.*

This is a very peculiar plant and like no other European species. Its *leaves* are so crowded and so cut into fine capillary interwoven segments that the whole has almost the texture of sponge. The *colour* is peculiarly pale, and there is no apparent *calyptra*, at least at the time when the fruit is in perfection.

** *Lower or smaller segments (of the leaves) involute.*

67. J. *Mackáii*, Hook, (*Mr. Mackay's Jungermannia*); stem creeping irregularly branched, leaves unequally 2-lobed the upper lobes rounded the lower ones minute involute, stipules large roundish obcordate, fruit lateral and terminal, perianth obcordate compressed gibbous below, the mouth contracted elevated toothed. *Hook. Br. Jung. p.* 53. *E. Bot. t.* 2573. *Hobs. Br. Mosses, v.* 2. *n.* 97. *Lindenb. Syn. Hepat. p.* 20.

Trunks of trees and rocks, especially in a limestone country, rare. Dargle, *J. T. Mackay, Esq.*, and Ballilicky near Bantry, *Miss Hutchins.* Killarney, *Mr. Wilson.* Lowdore, Cumberland; and Mt. Edgecombe, Devon, *C. Lyell, Esq.* Throughout the limestone tracts in the south of Devon, particularly in the fissures of rocks near Torquay, *W. J. H.* River side, Aber, N. Wales, *Mr. Wilson.* *Fr.* Winter and Spring.—A very distinct and little known species. The *capsule* (of a delicate texture) is globose and the *spiral filaments* are enclosed in transparent tubes, as in the remaining species of this and the following subdivision.

68. J. *serpyllifólia*, Dicks. (*thyme-leaved Jungermannia*); stem creeping irregularly pinnated, leaves unequally 2-lobed upper lobes rounded lower ones minute involute, stipules rounded acutely bifid, fruit lateral, perianth broadly obovate pentagonal, the mouth contracted elevated and somewhat toothed, capsule pellucid quadrifid. *Dicks. Cr. Fasc.* 4. *p.* 19. *Hook. Br. Jung. t.* 42. *E. Bot. t.* 2537. *Hobs. Br. Mosses, v.* 2. *n.* 108. *Lindenb. Syn. Hepat. p.* 21.—*Dill. Musc. t.* 72. *f.* 30.

Trees and rocks in alpine and subalpine districts. *Fr.* Apr. May.—A small pale green plant, forming, with the three following species, a most natural and beautiful little groupe, distinguished by their angular *perianths*, white, membranous, transparent, reticulated, quadrifid *capsule* and green *seeds*. By its affinity to *J. Mackaii*, however, it is connected with *J. Hutchinsiæ* and other species.

69. J. *hamatifólia*, Hook. (*hook-leaved Jungermannia*); stem creeping irregularly branched, leaves unequally 2-lobed the upper lobes ovate acuminate often curved at the point the lower ones involute, stipules ovate acutely bifid, fruit lateral, perianth obovate pentagonal, the mouth contracted elevated toothed, capsule transparent quadrifid. *Hook. Br. Jung. t.* 51. *E. Bot. t.* 2592. *Lindenb. Syn. Hepat. p.* 23.—*β. echinata;* leaves beautiful echinated. *Hook. l. c. Suppl. t.* 3.

Rocks and trees, but local and in subalpine districts. Yorkshire, Cumberland, Devonshire. About Dublin and in the south of Ireland, where *Miss Hutchins* found it growing on the stems of *Ulex nana*,

along with *J. calyptifolia*. *Fr.* March.—A singular little plant, forming small green tufts, whose *foliage* is not distinctly visible to the naked eye; yet it is larger than in the following species. "A curious *var.* is found by Dr. Taylor at Woodlands, near Dublin, incrusting *Anomodon viticulosum;* its *stipules* are hardly to be discerned, and the *perianth* is destitute of the winged angles and tubular mouth usually seen in the species." *Wils.*

70. J. *minutíssima*, Sm. (*minute round-leaved Jungermannia*); stem creeping irregularly branched, leaves unequally (and imperfectly) 2-lobed the upper lobes hemisphærical the lower ones minute almost obsolete, stipules ovato-rotundate bifid, fruit lateral, perianth obovate-rotundate pentagonal, the mouth contracted slightly toothed, capsule transparent quadrifid. *E. Bot. t.* 1633. *Hook. Br. Jung. t.* 52. *Hobs. Br. Mosses, v.* 2. *n.* 99. *Lindenb. Syn. Hepat. p.* 23.—*Dill. Musc. t.* 72. *f.* 29.

Bark of Holly, Ash and Fir; as well as on rocks, principally in the south of England and Ireland: first discovered by *C. Lyell, Esq.* Near Dublin, *Dr. Taylor.* Not rare in Cheshire. *Fr.* Apr. May.—This well deserves the name which Sir J. E. Smith has given to it, for it is certainly the most minute species with which I am acquainted; its tufts form small green granulated patches. Mr. Wilson observes that *stipules* are seen upon the barren branches only.

71. J. *calyptrifólia*, Hook. (*hooded-leaved Jungermannia*); stem creeping branched, leaves unequally 2-lobed, the upper lobes larger calyptriform the lower ones obtusely quadrate circumvolute, fruit lateral, perianth oblong depressed and plane at the apex quinquedentate, the mouth minute contracted, capsule transparent quadrifid. *Hook. Br. Jung. t.* 43. *E. Bot. t.* 2538. *Lindenb. Syn. Hepat. p.* 24.

On the stems of *Ulex nana*, near Bantry, *Miss Hutchins.* Killarney, *W. J. H.*, where at Turk cascade it is more plentiful on Fir-trees than on *Ulex*, and always grows in very small detached tufts. *Mr. Wilson.* Lowdore, *C. Lyell, Esq.* *Fr.* Oct. Nov.—This species is not only among the most minute, but amongst the most singular in structure of all the *Jungermanniæ.* Its *leaves* almost exactly resemble the *calyptra* of a moss, and they are remarkably attenuated at the point; the opening at the base is almost covered by the circumvolute lesser *lobe.*

*** *Lower or smaller segments* (*of the leaves*) *saccate.*

72. J. *Hutchínsiæ*, Hook. (*Miss Hutchins' Jungermannia*); stem creeping branched, leaves unequally 2-lobed the upper lobes ovate spinuloso-serrate the lower ones minute saccate at the base frequently unidentate, stipules roundish-ovate subserrate acutely bifid, fruit lateral, perianth obcordate triangular. *Hook. Br. Jung. t.* 1. *E. Bot. t.* 2480. *Lindenb. Syn. Hepat. p.* 18.

First discovered in the South of Ireland, at Glengariff near Bantry, along the banks of the first river, going from Bantry, above the waterfall; and in gloomy caverns at the side of other mountain rivulets, by *Miss Hutchins.* Turk waterfall and other places near Killarney; Ballinhasig Glen, near Cork; and in a barren state in the pass of Llanberis at the foot of Glyder Mountain, N. Wales. *Fr.* March.—This beauti-

ful and very distinct species seems almost wholly confined to the south of Ireland, and there only has it been found in fructification.

73. J. *dilatáta*, Linn. (*dilated Jungermannia*); stem creeping irregularly branched, leaves unequally 2-lobed the upper lobes roundish acute the lower ones roundish saccate, stipules roundish plane emarginate, fruit terminal, perianth obcordate tuberculated triangular. *Linn. Sp. Pl. p.* 1600. *Hook. Br. Jung. t.* 5. *Hobs. Br. Mosses, v.* 2. *n.* 91. *Lindenb. Syn. Hepat. p.* 17.—*Lejeunia, Libert.*—*J. tamariscifolia, Schreb.*—*E. Bot. t.* 1086.—*Dill. Musc. t.* 72. *f.* 27.

Trunks of trees; very frequent. *Fr.* Winter and Spr.—One of the most general of all *Jungermanniæ*, colouring the trunks of trees with brown spots or blotches. It must be carefully distinguished from the following, which is often confounded with it.

74. J. *Tamarísci*, Linn. (*Tamarisk Jungermannia*); stem creeping pinnatedly branched, leaves unequally 2-lobed the upper lobes ovato-rotundate the lower ones minute obovate saccate, stipules subquadrate emarginate the margins revolute, fruit on short terminal branches, perianth obovate smooth, triangular. *Linn. Sp. Pl. p.* 1600. *Hook. Br. Jung. t.* 6. *E. Bot. t.* 2480. *Hobs. Br. Mosses, v.* 2. *n.* 112. *Lindenb. Syn. Hepat. p.* 17.—*Dill. Musc. t.* 72. *f.* 31.

On the ground and creeping over low bushes, especially in subalpine countries, common. *Fr.* July, Aug.—Besides the characters above given, this may be distinguished by its longer and more regularly pinnated *stems*, which grow in large lax tufts. A *var.* is found by Mr. Wilson on Turk mountain, Ireland, with the larger *lobe* of the *leaf* evidently and sharply apiculate, as well as the segments or lobes of the *stipules*.

II. Frondose.

a. *Fronds destitute of nerve.*

75. J. *pínguis*, Linn. (*slippery Jungermannia*); frond oblong decumbent nerveless fleshy plane above, beneath tumid irregularly branched the margins sinuate, fruit from the lower part near the margin, perianth very short, the mouth dilated fimbriated, calyptra exserted oblongo-cylindrical smooth. *Linn. Sp. Pl. p.* 1602. *E. Bot. t.* 185. *Hook. Br. Jung. t.* 46. *Lindenb. Syn. Hepat. p.* 98.—*Metzgeria pinguis, Corda.*—*Dill. Musc. t.* 74. *f.* 42, (*excl. fig. R, S, K.*)—β. *angustior;* frond elongated almost linear simple or bipinnatedly branched.

Bogs and watery places.—β. in pools of water among *confervæ* and other aquatics. *Fr.* Summer.

76. J. *multífida*, Linn. (*many-lobed Jungermannia*); frond linear nerveless fleshy compressed bipinnatifidly branched, fruit marginal, perianth very short, the mouth dilated fimbriated, calyptra exserted oblongo-cylindrical tuberculated. *Linn. Sp. Pl. p.* 1602. *E. Bot. t.* 186. *Hook. Br. Jung. t.* 45. *Hobs. Br. Mosses, v.* 2. *n.* 100. *Lindenb. Syn. Hepat. p.* 98.—*Anthoceros multifidus, Dicks.*—*Dill. Musc. t.* 74. *f.* 43.—β. *sinuata:* fronds

broader branched the margin sinuated. *J. sinuata, Dicks. Cr. Fasc.* 2. *p.* 16.—*Dill. Musc. t.* 74. *f.* 44.—γ. *palmata;* short dense upright, fronds branched in a somewhat palmated manner. *J. furcata, Hedw.*

Wet places, upon heaths, in marshes and by the sides of ditches; both α. and β.—γ. mostly on decayed stumps of trees. *Fr.* Spr.—Allied to the preceding, but truly distinct. Its *fronds* are far narrower, evidently reticulated, equally compressed on both sides, and the *calyptra* is tuberculated.

b. *Fronds furnished with a nerve or costa.*

* *Perianth single.*

77. J. *Blásia*, Hook. (*flask-bearing Jungermannia*); frond oblong submembranaceous dichotomous costate with scattered toothed scales below, fruit arising from the upper side of the costa, perianth and calyptra within the frond. *Hook. Br. Jung. t.* 82, 83, *and* 84. *Hobs. Br. Mosses, v.* 1. *n.* 109. *Lindenb. Syn. Hepat. p.* 96.—*Blasia Hookeri, Corda in Sturm Deutschl. Fl. cum Ic.*—*Blasia pusilla, Linn. Sp. Pl. p.* 1605. *E. Bot. t.* 1328. —*Dill. Musc. t.* 31. *f.* 7.

Moist heaths, on sandy ground occasionally inundated: not uncommon in the mountainous and subalpine parts of England, Scotland and Ireland. *Fr.* (rare) March and April.—This is a truly extraordinary plant, of which ample details are given in the *Monograph* of *British Jungermanniæ* quoted above. *Anthers?* oblong and reticulated are imbedded in the costa. *Gemmæ* of two kinds are found: the one contained in a hollowed receptacle within the nerve, having a long tubular beak. These are pale green, globose, reticulated, having a fibrous radicle, and, when ready to escape, flowing in considerable numbers through the mouth of the tube. The 2d kind consists of small almost black sphærical masses of a granular or pulpy substance, appearing within the epidermis on the underside of the frond, often covered by the scales. The *pistils* of the *female flowers* are seen upon the nerve, on the outside of the frond, quite exposed. In a more advanced stage, the fertilized pistil is found in an oval cavity within the substance of the frond, and surrounded by a membranous bag or *perianth*, whose summit is attached to an umbilicus on the upper side of the closed cavity. At length, the frond bursts with an irregular opening near the extremity, and the *calyptra* in part, and the *capsule* and elongated *peduncle* entirely, are protruded. *Spiral filaments* of a double helix. *Seeds* of 2 to 4 grains combined together and enveloped in a pellucid membrane.—The late *Mr. Hobson* discovered this species with fructification near Manchester; and Mr. Wilson finds it near Aber, N. Wales, and in Delamere Forest, Cheshire.

78. J. *epiphýlla*, Linn. (*broad-leaved Jungermannia*); frond oblong submembranaceous irregularly divided obscurely costate the margin entire or somewhat lobed and sinuated, fruit from the upper side of the frond and near the apex, perianth subcylindrical plicate, the mouth somewhat dilated inciso-dentate, calyptra exserted smooth. *Linn. Sp. Pl. p.* 1602. *E. Bot. t.* 771. *Hook. Br. Jung. t.* 47. *Hobs. Br. Mosses, v.* 1. *n.* 108.

Lindenb. Syn. Hepat. p. 97.—*Pollia, Corda.*—*Dill. Musc. t.* 74. *f.* 41.—β. *longifolia;* fronds elongated simple or only here and there divided by innovations. *J. endiviæfolia, Dicks.*—γ. *furcigera;* fronds at the apex dichotomously divided with narrow innovations.

Moist ground, frequent.—β. Bogs and ditches.—γ. Not uncommon in rather dry situations, especially in the winter months. *Fr.* Spr. and Aut.—This fine species may frequently be seen in damp shady places, by the sides of springs and wells, with its white sparkling silvery threads, which are of most rapid growth, bearing at their summit the pale-brown *capsule*, which, when the valves are fully expanded, bears the *spiral filaments* in a beautiful tuft or pencil in the centre.

79. J. *furcáta*, Linn. (*forked Jungermannia*); frond linear dichotomous membranaceous costate glabrous above, beneath and on the margin more or less hairy, fruit from the midrib on the underside, perianth 2-lobed conduplicate the margin ciliated, calyptra obovate crisped. *Linn. Sp. Pl. p.* 1602. *E. Bot. t.* 1632. *Hook. Br. Jung. t.* 55, 56. *Hobs. Br. Mosses, v.* 1. *p.* 110. *Lindenb. Syn. Hepat. p.* 94.—*Dill. Musc. t.* 74. *f.* 45—β. *elongata;* frond larger more elongated and straighter.—*J. furcata,* β. *maxima; Web.*—γ. *æruginosa;* frond broader blue-green, the extremities (except in the gemmiferous plant) dilated very obtuse. *J. fruticulosa, E. Bot. t.* 2514.—*Riccia fruticulosa, Dicks. Cr. Fasc.* 1. *p.* 8.

On trunks of trees and sometimes on low bushes, heathy ground, rocks, &c., abundant.—β. on rocks in subalpine countries.—γ. on trees in the West of England, (*Mr. Wilson,*) Scotland and Ireland. *Fr.* Winter and Spr.—The *fructification* of this, again, is very peculiar. *Anthers* are found on the costa, on the underside of the frond, enclosed in and attached to a costate scale, rolled up like a ball. *Gemmæ* appear on the æruginose *var.*, terminating narrow prolongations of the forking of the frond.

80. J. *pubéscens,* Schrank, (*downy Jungermannia*); frond linear dichotomous membranaceous costate pubescent on both sides. *Schrank, Salisb. p.* 231. *Hook. Br. Jung. t.* 73. *Hobs. Br. Mosses, v.* 2. *n.* 104. *Lindenb. Syn. Hepat. p.* 95.—*J. tomentosa, Hoffm.*

Moist rocks, frequent in alpine situations. *Fr.* unknown.—Although so nearly allied to the preceding as not to be distinguished but by its larger size and its *fronds* thickly downy on both sides, yet it appears constant to these characters. The *fruit* has never been found, but *anthers* are frequent and enclosed in a receptacle similar to that described under *J. furcata,* only it is densely hairy.

** *Perianth double.*

81. *J. Lyéllii,* Hook. (*Mr. Lyell's Jungermannia*); frond oblong somewhat dichotomously branched membranaceous costate, fruit from the costa above, perianth double the exterior very short toothed and laciniated the inner much exserted cylindrical subplicate.—*a.* scales of the anthers much laciniated crowded.

J. Lyellii, Hook. Br. Jung. t. 77. *Lindenb. Syn. Hepat. p.* 96. *Diplomitrion, Corda.*—β. larger, scales of the anthers lax scarcely toothed. *J. Hibernica, Hook. Br. Jung. t.* 78. *Lindenb. Syn. Hepat. p.* 95.

First found in boggy plains in the New Forest, Hampshire, and at Drumly Airy, a waterfall on the Noran, Angusshire, by *C. Lyell, Esq.* Near Bantry, Ireland, *Miss Hutchins.* Near the bridge at Aberffraw, growing in small radiated tufts, soon covered (before the capsule is ripe) by the drifted sand of the sea-shore, *Mr. Wilson.*—β. Lough Bray, near Dublin, *Dr. Taylor.* Catlaw, Angusshire, *C. Lyell, Esq. Fr.* Spr.—At the suggestion of Mr. Wilson, I readily unite the *J. Hibernica* of the *British Jungermanniæ* with *J. Lyellii.* I had laid some stress upon the relative length of the *calyptra* and *inner perianth*, but I am now inclined to believe it is a fallacious character, and that none better can be found (and those certainly liable to vary) than the difference in the size of the plants, and in the scales of the midrib on the underside which conceal the *anthers.*

Obs. There being already a *J. affinis*, of Nees Von Esenbeck, the plant which bears that name at *p.* 111, *n.* 18. of this volume should be altered to *J. turbinata, Wilson in E. Bot. Suppl. ined*

LICHENES.

ORDER IV. LICHENES.[1] *Ach.* Lichens.

Perennial *Plants*, varying exceedingly in their form, appearance and texture, always constituting a *thallus*, *crust*, or *frond* (*universal receptacle, Ach.*), which frequently spreads horizontally upon soil, rocks, stones, the bark of trees and dead wood, and is pulverulent, membranaceous, coriaceous, gelatinous, filamentose, and variously lobed and divided: sometimes it is erect, fruticulose and much branched; at other times pendent; variously coloured, rarely green: often the *substance* is simply composed of *cellules*, at other times the *cellules* are mixed with *fibres*. Imperfect *roots* are sometimes formed, but more for the purpose of fixing the plant to its place of growth than of deriving nutriment, which appears to be afforded solely by the air. *Fructification* is of two kinds: a *powdery substance*, forming indeterminate masses, or collected into more or less evident *receptacles;* and, what is considered a higher state of fructification, *apothecia*, or *partial receptacles*, which have received different names according to their forms:—*scutellæ* or *shields*, as in *Lecanora* and *Parmelia: patellulæ* (*spangles, Sm.*), as in *Lecidea; lirellæ*, *clefts*, as in *Opegrapha; mycinæ*, as in *Bæomyces; pilidia* (*puffs, Sm.*), as in *Calicium; orbillæ*, as in *Usnea; peltæ*, *targets*, as in *Peltidea; tricæ* or *gyromata* (*buttons, Sm.*), as in *Gyrophora; tubercula*, *tubercles*, as in *Verrucaria; cistulæ* (*cellules, Sm.*), as in *Spærophoron; cephalodia* (*knobs, Sm.*), as in *Scyphophorus*, (when the stalk which bears them is called *podetium*); *pulvinuli* (*naked sporules*), as in *Spiloma; variolæ* (*pustules*), as in *Variolaria:* — these, for the most part, are sessile, perennial, and contain a somewhat waxy plate or layer (*lamina proligera, Ach.*), in which are imbedded *seeds*, or *sporules*, enclosed in little membranous *tubes* or *thecæ*.

The *Lichens* are, perhaps, more nearly allied to the *Fungi* than to the *Algæ*, in general appearance. Some *Peziza*, among the former, resemble certain *Lichens*, destitute of, or with an imperfect, *thallus;* and the Genus *Lichina* is considered by many to have as great a claim to rank with the *Lichens* as among the *Algæ*, in which it is usually placed. By the Genus *Endocarpon* they approach the *Hepaticæ*. They are among the

[1] From λειχην, a *wart*, which the fructifications often resemble.

first plants which clothe the bare rocks and form a humus for others of a higher organization to live and flourish in. In the arts, in domestic economy, (scarcely in medicine,) many of them are highly valuable, as will be mentioned under the respective species.

The Genera of Acharius, being those in most general use, are here adopted, with some modifications: and the arrangement followed is founded on that of M. Feé (published in his "*Essai sur les Cryptogames des Ecorces exotiques officinales*"), which arrangement appears to me to be the most natural of any that has hitherto appeared. Eschweiler, Fries, Agardh, Meyer, Walroth, and Chevalier, have likewise proposed new methods; but I have not yet had the opportunity of studying their respective merits. It will be seen in this and the remaining Orders of Cryptogamia, that the plant itself, independent of the *fructification* or *reproductive organs*, by whatever name they may be called, is essential in distinguishing the genera, as is also the fructification.

It is to be regretted that no publication of *specimens* of the *Lichens* of Great Britain, (which have been so successfully ascertained and described by the labours of Dickson, Smith, Turner, and Borrer) similar to those of *Mosses* by Drummond and Hobson, and of *Hepaticæ* by the latter, has appeared. Such a work (including other Cryptogamic Plants) was begun by Mr. Baxter, of Oxford, but the author died before it had reached the 3d Fasciculus; and no one has undertaken the continuation. Upon the Continent many have appeared of considerable merit, and which have proved of great utility in the study of Cryptogamic Botany. I may particularly mention the *Stirpes Cryptogamicæ Vogeso-Rhenanæ* of Mougeot and Nestler, the *Cryptogamische Gewächse besonders des Fichtelberg* of Funck, the *Lichenes Exsiccati* of Reichenbach and Schubert, and above all the *Lichenes Helvetici Exsiccati* of my valued and learned friend M. Schærer, Minister of Lauperswyl, in the Canton of Berne, with whom I have collected many of the specimens contained in his work, in one of the most delightful excursions I ever made upon the Alps of Switzerland. These publications, however, are rare in this country, and I shall limit my references to that of M. Schærer, than whom no one has studied the family with more ardour and enthusiasm, nor under more favourable circumstances; whether his situation be considered, surrounded as is his place of residence by lofty mountains and the noblest forests, or his extended correspondence with the most eminent Lichenographists of Europe. With such helps as these now enumerated, and such figures as those of English Botany, the difficulty of studying this extensive and intricate tribe will be found much diminished.

Synopsis of the Genera.

I. *Thallus adherent, crustaceous, amorphous.*

A. *Apothecia more or less stipitate.*

a. *Apothecia rounded, fleshy, with the stipes solid (mycinæ).* Pseudo-Fungi.

Fam. I. Bæomyceæ.

1. Bæomýces. *Thallus* crustaceous, spreading, adnate. *Apothecia (mycinæ)* orbicular, convex, capituliform, not bordered, sessile upon a solid *stipes.*

b. *Apothecia hollow, goblet-shaped (pilidia).*

Fam. II. Calicioideæ.

2. Calícium. *Thallus* crustaceous, spreading, adnate, uniform. *Apothecia (pilidia)* goblet-shaped, more or less stipitate, filled with a compact pulverulent mass which constitutes the *disk* and is plane or subglobose.

B. *Apothecia sessile.*

a. *Apothecia linear (lirellæ).* Pseudo-Hypoxyla.

Fam. III. Graphideæ.

3. Arthónia. *Thallus* crustaceous, spreading, adnate, uniform, cartilagineo-membranaceous. *Apothecia* innately sessile, roundish, but varying in form, sometimes elongated, nearly plane, not bordered, black, covered by a subcartilaginous membrane, within subgelatinous, uniform.

4. Opégrapha. *Thallus* crustaceous, membranaceous or leprose, spreading, adnate, uniform. *Apothecia (lirellæ)* elongated, simple or branched, sessile or immersed, the *disk* narrow with a proper *border* and sometimes with an additional one derived from the thallus.

b. Apothecia hemisphærical (tubercula), enclosing a nucleus.

Fam. IV. Verrucarieæ.

5. Verrucária. *Thallus* crustaceous or cartilagineo-membranaceous, spreading, adnate, uniform. *Apothecia (tubercula)* hemisphærical or subglobose, innate and immersed or sessile, corneous, of a different colour and substance from the *thallus*, (mostly a black crust or shell,) enclosing a *nucleus*, the apex papillary, often at length perforated, sometimes covered by the wart-like processes of the *thallus.*

6. ENDOCÁRPON. *Thallus* crustaceous or cartilaginous often lobed or foliaceous. *Apothecia* globose, imbedded in the *thallus*, with a slightly prominent apex and including a *nucleus*.

7. PERTUSÁRIA. *Thallus* cartilagineo-membranaceous, spreading, adnate, uniform. *Apothecia* verruciform, formed of the *thallus*, one-or many-celled, each cell containing a *nucleus*, the apex depressed, coloured, often distorted.

8. THELOTRÉMA. *Thallus* crustaceo-cartilaginous, spreading, adnate, uniform. *Apothecium* double, the *outer* consisting of an open *wart* formed of the thallus, the *inner* (one or two) thin, membranaceous, breaking away at the top, its *disk* containing a *nucleus*.

(TRUE LICHENS.)

c. Apothecia? naked sporules (gongyli or pulvinuli).

FAM. V. LEPRARIEÆ.

9. LEPRÁRIA. *Thallus* crustaceo-leprose, spreading, adnate, uniform. *Apothecia* none. *Sporules* naked, forming the *thallus*, scattered and conglomerated, free.

10. SPILÓMA. *Thallus* crustaceous, spreading, adnate, uniform. *Apothecia* none. *Sporules* naked, coloured, collected into compact tumid masses.

d. *Apothecia opening into depressed or hollow shields or pustules (variolæ).*

FAM. VI. VARIOLARIEÆ.

11. VARIOLÁRIA. *Thallus* crustaceous, membranaceous, adnate, spreading, uniform. *Apothecium* a suborbicular, scutelliform cup, formed of the *thallus*, filled with a powdery or flocculose substance, which covers an immersed waxy *disk* containing imbedded *thecæ*.

e. *Apothecia bordered, discoid, sessile (patellulæ).*

FAM. VII. LECANOREÆ.

12. URCEOLÁRIA. *Thallus* crustaceous, spreading, adnate, uniform. *Apothecia* (*patellulæ*) orbicular, the *disk* concave, coloured, immersed in the crust, *border* formed of the crust and of the same colour.

13. LECIDÉA. *Thallus* crustaceous, spreading, adnate, uniform. *Apothecia* (*patellulæ*) orbicular, sessile, plano-convex, having a *border* of the same colour as the *disk*.

14. LECANÓRA. *Thallus* crustaceous, spreading, plane, adnate, uniform. *Apothecia* (*patellulæ*) orbicular, thick, sessile and adnate, the *disk* plano-convex, its *border* thickish, formed of the crust and of the same colour.

II. *Thallus subfoliaceous, consisting of scales attached to the substance on which they grow and more or less combined together. Apothecia always bordered and discoid, sessile (patellulæ).*

FAM. VIII. SQUAMARIEÆ.

15. PSÓRA. *Thallus* defined, thick, formed of distinct flattish or convex *tubercles* or *scales*. *Apothecia* (*patellulæ*) bordered, plane, at length convex, placed at the side of the scales, the *border* of the same colour as the *disk*.

16. SQUAMÁRIA. *Thallus* defined, scaly, spreading, orbicular, and stellate, the scales distinct or adherent, often imbricated, diverging. *Apothecia* (*patellulæ*) bordered, the *border* of the same substance and colour as the thallus.

17. PLACÓDIUM. *Thallus* defined, orbicular and stellated, the scales adherent, indistinct, subpulverulent, foliaceous in the circumference. *Apothecia* (*patellulæ*) in the centre of the *thallus*, bordered, the *border* of the same colour as the *disk*.

III. *Thallus loose, scarcely attached, except by fibres or radicles or a small base, to the substances whereon it grows.*

A. *Upper surface different from the under.*

a. *Attachment of the thallus diffuse, (not fixed by a central point).*

α. *Apothecia scutelliform, discoid, bordered, attached by the centre (scutellæ).*

* *Thallus more or less membranaceous.*

FAM. IX. PARMELIACEÆ.

18. PARMÉLIA. *Thallus* foliaceous, membranaceous or coriaceous, spreading, lobed and stellated or laciniated, more or less fibrous beneath. *Apothecia* (*scutellæ*) orbicular, beneath formed of the thallus, free, fixed only by a central point, *disk* concave, coloured, its *border* formed by the inflexed thallus.

19. STÍCTA. *Thallus* foliaceous, coriaceo-cartilaginous, spreading, lobed, free and downy beneath, with little *cavities* or *hollow spots* (*cyphellæ*) often containing a powdery substance. *Apothecia* (*scutellæ*) beneath formed of the *thallus* to which they are appressed and fixed by a central point, the *disk* coloured, plane, surrounded by an elevated *border* formed of the *thallus*.

** *Thallus (in a moist state) of a gelatinous substance.*

FAM. X. COLLEMATEÆ.

20. COLLÉMA. *Thallus* entirely of one substance, gelatinous, when dry generally becoming hard and cartilaginous, polymorphous, granulated, foliaceous, lobed, laciniated or branched. *Apothecia* (*scutellæ*) orbicular, sessile (rarely substipitate), bor-

dered, entirely formed of the substance of the *thallus*, the *disk* sometimes coloured.

β. *Apothecia uniform, not, or scarcely, margined, suborbicular, often having the appearance of the nail of the human hand* (*peltæ*).

Fam. XI. Peltigereæ.

21. Solorína. *Thallus* foliaceous, coriaceous, lobed, free, beneath having fibrous or woolly veins. *Apothecia* (*peltæ*) adnate, sometimes immersed, orbicular (distant from the margin), not bordered.

22. Peltidéa. *Thallus* foliaceous, coriaceous or membranaceous, spreading, lobed, with woolly veins beneath, the lobules fertile. *Apothecia* (*peltæ*) suborbicular, adnate on the *upper side* of the lobules or proper portions of the *thallus* and having a *border* formed of the thallus.

23. Nephróma. *Thallus* foliaceous, coriaceous or membranaceous, spreading, lobed, naked or hairy beneath, the lobules fertile. *Apothecia* (*peltæ*) orbicular, reniform, adnate on the *underside* of the lobules or proper portions of the *thallus* and having a border formed of the *thallus*.

b. *Attachment of the, more or less orbicular, thallus by the centre.*

Fam. XII. Umbilicarieæ.

24. Gyróphora. *Thallus* foliaceous, coriaceous or membranaceous, fixed by the centre, peltate. *Apothecia* (*tricæ* or *gyromata*) orbicular, subscutelliform, sessile and adnate, covered by a black membrane, the *disk* marked with concentric *circles* or *plicæ* with a *border* of its own substance.

25. Umbilicária. *Thallus* foliaceous, coriaceo-membranaceous, pustuled, fixed by the centre, peltate. *Apothecia* orbicular, somewhat concave, adnate, covered by a black membrane, the *disk* at length tubercled, with a *border* of its own substance.

B. *Upper and under surfaces of the thallus alike.*

a. *Thallus usually compressed and laciniated. Apothecia scutelliform* (*scutellæ*).

Fam. XIII. Ramalineæ.

26. Cetrária. *Thallus* foliaceous, cartilagineo-membranaceous, ascending or spreading, lobed and laciniated, on each side smooth and naked. *Apothecia* orbicular, obliquely adnate with the margin of the *thallus*, the lower portion being free (not united with the *thallus*); the *disk* coloured, plano-concave, with a *border* formed of the thallus and inflexed.

27. Roccélla. *Thallus* coriaceo-cartilaginous, rounded or plane, branched or laciniated. *Apothecia* orbicular, adnate with the *thallus;* the *disk* coloured, plano-convex, with a *border* at length thickened and elevated, formed of the *thallus* and covering a *sublentiform* black compact pulverulent *powder*, concealed within the substance of the thallus.

28. Borréra. *Thallus* cartilaginous, branched and laciniated, the segments free, generally grooved beneath, the margins frequently ciliated. *Apothecia* orbicular, peltate, formed of the thallus beneath; the *disk* coloured and surrounded by the elevated and inflexed *border* formed also of the thallus.

29. Evérnia. *Thallus* subcrustaceous, branched and laciniated, angled or compressed, cottony within, (*intus stuppeus*). *Apothecia* orbicular, scutelliform, sessile; the *disk* concave, coloured, with an inflexed *border* formed of the thallus.

30. Ramalína. *Thallus* cartilaginous, branched and laciniated, somewhat shrubby, generally bearing powdery *warts*, compactly cottony within. *Apothecia* orbicular, scutelliform, stipitate and peltate, plane, bordered, entirely formed of the substance of the thallus and nearly of the same colour.

b. *Thallus subcylindrical, filamentous, mostly pendent.*

a. Thallus with a central thread. Apothecia scutelliform, without a border, ciliated (*orbillæ*).

Fam. XIV. Usneæ.

31. Usnéa. *Thallus* subcrustaceous, rounded, branched, generally pendulous, with a central *thread*. *Apothecia* (*orbillæ*) orbicular, terminal, peltate, entirely formed of the substance of the thallus and nearly of the same colour, the circumference mostly without a border and (generally) ciliated.

β. Thallus without a central thread, sometimes slightly compressed. Apothecia scutelliform.

Fam. XV. Cornicularieæ.

32. Alectória. *Thallus* cartilaginous, subfiliform, branched, prostrate or pendulous, somewhat fistulose and cottony within. *Apothecia* orbicular, thick, sessile, plane or convex, more or less bordered, entirely formed of the thallus and of the same colour.

33. Corniculária. *Thallus* cartilaginous, branched, within nearly solid and cottony. *Apothecia* orbicular, terminal, obliquely peltate, entirely formed of the substance of the thallus, at length convex, more or less bordered and often toothed.

c. *Thallus shrubby, rounded, usually much branched, mostly erect.*

α. *Solid. Apothecia globose, filled with a black powder (cistulæ) or solid.*

Fam. XVI. Sphærophoreæ.

34. Isídium. *Thallus* crustaceous, spreading, adnate, bearing solid erect branches (or *podetia?*). *Apothecia* orbicular, convex, at length subglobose, solid, terminal upon the *podetia* and more or less sunk in the extremity, so as to leave a border of the substance of the *podetium*.

35. Sphærophóron. *Thallus* crustaceo-cartilaginous, branched, suffruticose, solid within. *Apothecia* (*cistulæ*) subglobose, sessile, terminal on the branches of the *thallus* and formed of it, breaking with a torn margin and containing within a pulverulent black mass collected into a ball.

36. Stereocaúlon. *Thallus* cartilaginous or somewhat woody, branched and fructiculose. *Apothecia* turbinate, sessile, solid, plane, scarcely rising above the border; the *disk* at length spreading, covering the border and reflexed.

β. *Thallus (or podetium?) fistulose. Apothecia hemisphærical, fleshy (cephalodia).*

Fam. XVII. Cladonieæ.

37. Cladónia. *Thallus* somewhat shrubby, branched, rarely simple, leafy with scales which are at length often evanescent; *branches* (*podetia, Ach.*) cartilaginous, rigid, fistulose, all attenuated and subulate, divided, fertile, generally perforated in the axils. *Apothecia* (*cephalodia*) sessile, orbicular, convex, capituliform, not bordered, fixed by the circumference, free beneath in the centre, the sides reflexed, uniform within. (*Feé.*)

38. Scyphóphorus. *Thallus* foliaceous, imbricated; *podetia* fistulose, cylindrical, dilated upwards, bearing cups, or attenuated and subulate, *cups* closed with a membrane, or cleft at the extremity, often rayed in a somewhat digitated manner, the *rays* all fertile. *Apothecia* (*cephalodia*) convex, capituliform, not bordered, free in the centre beneath, arranged around the edges of the cup, the margin reflexed, uniform within. (*Feé.*)

39. Pycnothélia. *Thallus* subcrustaceous, uniform; *podetia* (mostly simple short) hollow. *Apothecia* (*cephalodia*) orbicular, not bordered, capituliform, thickened, inflated beneath, terminal, reflexed at the margin, uniform within. (*Feé.*)

CRYPTOGAMIA LICHENES.

I. *Thallus adherent, crustaceous, amorphous.*

A. *Apothecia more or less stipitate.*

a. *Apothecia rounded, fleshy, with the stipes solid (mycinæ).* Pseudo-Fungi.

Fam. I. Bæomyceæ.

1. Bæomýces. *Pers.*

Thallus crustaceous, spreading, adnate. *Apothecia* (*mycinæ*) orbicular, convex, capituliform, not bordered, sessile, upon a solid stipes. — Name; *βαιος, small,* and *μυκης,* a *Fungus* or *Mushroom.* This genus approaches the *Fungi* in many respects, even in its odour. The *podetia* are solid, fleshy and of the same texture as the *apothecia;* hence, and on account of the different nature of the *thallus,* the species are widely separated from the *Cenomyceæ,* near which they were arranged by Acharius.

1. B. *róseus,* Pers. (*rose-coloured Mushroom Bæomyces*); crust uniform granulated greenish-white, stripes very short cylindrical, apothecia subglobose wrinkled pale flesh-coloured. *Ach. Syn. p.* 280. *Hook. Scot. P. II. p.* 65. *Schær. Lich. Helv. p.* 16. *n.* 31.—*Lichen Bæomyces, Linn.*—*E. Bot. t.* 374.—*Dill. Musc. t.* 14. *f.* 1.

Heaths upon the ground, not unfrequent. Sir Jas. E. Smith compares the fructification of this to some minute *Helvella;* but the presence of a crust confirms the propriety of placing it among the *Lichens.*

2. B. *rúfus,* Wahl. (*brown Mushroom Bæomyces*); crust uniform granulated and pulverulent greenish-white, stipes short somewhat compressed, apothecia flattish at the top sometimes conglomerate reddish-brown. *Ach. Syn. p.* 280. *Hook. Scot. P. II. p.* 65.—*Bæomyces byssoides, Schær. Lich. Helv. p.* 17. *n.* 32. —*Lichen rufus, Huds. Angl. p.* 527.—*L. byssoides, Linn. Dill.*—*Musc. t.* 14. *f.* 3, *and* 5.

Rocks, old walls and, less frequently, on the ground in sandy soil. — *Crust* generally thinner and more pulverulent than the preceding; *stipes* more slender; *apothecia* smaller, more regularly orbicular, less wrinkled and of a dull red-brown colour.

3. B. *placophýllus,* Wahl. (*thick-crusted Bæomyces*); crust orbicular wrinkled and plicate subimbricated whitish and glaucescent formed in the circumference into rounded lobes and crenated, stipes a little swollen compressed, apothecia slightly convex simple red-brown. *Ach. Syn. p.* 281. *Meth. Lich p.* 323. *t.* 7. *f.* 4.

Wall top at Ach-na-drain, Ross-shire; *Borrer and Hook.* Appin, *Captain Carmichael.* — I have not seen the fructification of this, but the *thallus* well agrees with the description and figure of Acharius.

b. *Apothecia more or less stipitate, hollow, goblet-shaped (pilidia).*

Fam. II. Calicioideæ.

2. Calícium. *Ach.* Calicium.

Thallus crustaceous, spreading, adnate, uniform. *Apothecia (pilidia)* goblet-shaped, more or less stipitate, filled with a compact pulverulent mass of sporules, which constitutes the *disk* and is plane or subglobose.—Named from καλυκιον, a *little cup*, from the form of the apothecia. This remarkable and beautiful genus has been ranged among the *Fungi* by Persoon. The arrangement and characters are taken from *Turner and Borrer's Lichenographia Britannica*, still, unfortunately for the botanical world, unpublished.

* *Apothecia sessile.*

1. C. *séssile*, Pers. (*parasitic sessile Calicium*); crust none? pilidium sessile pyriform black polished with a thick inflexed border, sporules black. *Turn. and Bor. Lich. Br. p.* 128. *E. Bot. t.* 2520.—*C. stigonellum, Ach. Syn. p.* 56. *et Lich. Un. t.* 5. *f.* 5.—*C. turbinatum, Ach. Syn. p.* 56. *Schær. Lich. Helv. p.* 3. *n.* 6.—*Lichen gelastinatum, With. Bot. cum Ic.—Sphæria sphincterica, Sow. E. Fung. v.* 3. *t.* 286. (*but not Hypoxylon sphincterícum, Bull.—β. marginatum;* border of the capitulum white or greyish.

Common on the crust of *Porina pertusa.* — *Crust* apparently none. *Pilidium* minute, inversely conical or turbinate, the lower solid part constituting a very short stipes. The *apothecium* is at first convex with a minute dot in the centre which soon becomes depressed, and at length opens, disclosing an opaque powdery *disk* of a regularly circular outline, and in every stage surrounded by a thick, polished, elevated, entire and inflexed *border*. The place of growth of this plant is very remarkable; its *apothecia* are parasitic in the cracks of the *thallus* (where they are crowded) or in the depressions formed by the apertures of the *verrucæ* (in which they usually stand single) of *Porina pertusa Ach.*; or according to the observations of the late Sir T. Gage, upon *Lecanora Perella.*

2. C. *microcéphalum*, Sm. (*small-headed short-stalked Calicium*); crust granulated tartareous rugulose olive-coloured, pilidia sessile pyriform black polished with a thick inflexed border, sporules black. *E. Bot. t.* 1865. *Turn. and Borr. Lich. Br. p.* 130.

Oak rails by the sea, at Caister, near Yarmouth, *Mr. Turner.* Packington, *Lady Aylsford.* — The *pilidia* very much resemble those of *C. sessile*, but they arise from a crust belonging to the plant of an olive-brown colour, when moist a little inclining to green, and they are more decidedly stipitate: still the able authors of the *Lichenographia Britannica* seem to think it possible that these two species may be the same.

3. C. *tigillare*, Pers. (*yellow sessile Rail Calicium*); crust granulated tartareous bright greenish-yellow with large warts scattered over the surface, pilidia somewhat immersed in the warts (sessile) plano-convex black with an elevated tumid border, sporules black. *Turn. and Borr. Lich. Br. p.* 133. *Ach. Syn. p.* 55.—*Lichen tigillaris, Ach. Meth. p.* 46. *t.* 2. *f.* 1.

Old pales and rails, rarely on trees, in Essex and Suffolk. — This extremely beautiful *Calicium* is distinguished by its bright-coloured wide-spreading crust, with black, apparently entirely sessile, *apothecia* sunk in the crust; so that the plant looks, at first sight, like a *Lecidea:* but the *apothecia* are those of a *Calicium*, and Acharius says that they are sometimes borne on a very short *stipes*.

4. C. *tympanellum*, Ach. (*sooty-fruited Calicium*); crust granulated tartareous greyish-white, pilidia turbinate (sessile) partly immersed black with a thin erect whitish border, sporules pruinose. *Ach. Syn. p.* 56. *Turn. and Borr. Lich. Br. p.* 134. —*Lichen inquinans, E. Bot. t.* 810.

On old pales, and especially on the tops of posts, not uncommon: sometimes on the bark of trees. — This, from its almost entirely sessile and immersed *pilidia*, differs remarkably from the really stipitate *Calicia*. Its fructifications are, however, large, and the plant may be easily recognized by the readiness with which the profuse sporules detach themselves on being touched; so that on the application of the finger, an impression is received of as many *apothecia* as have been covered by it. The favourite situation of this plant is the tops of old posts, growing upon them, and therefore, transversely with the grain of the wood.

5. C. *ferrugineum*, Turn. and Borr. (*rusty Calicium*); crust granulated tartareous whitish with scattered rust-coloured spots, pilidia stipitate and sessile, capitulum turbinate, sporules rust-coloured covering the border. *Turn. and Borr. Lich. Br. p.* 136. *E. Bot. t.* 2473.

Old pales, Norfolk and Suffolk. — Crust of several inches in extent, composed of loosely cohering greyish granules, of a greyish white, marked with yellowish rust-coloured spots, which render the plant conspicuous. *Pilidia* sometimes confluent, sometimes partially immersed in the crust. *Stipes* very short and thick.

** *Apothecia stipitate.*

6. C. *clavellum*, Turn. and Borr. (*grey-crusted Calicium*); crust granulated tartareous whitish, pilidia stipitate, capitulum turbinate cæsious beneath with a thin elevated cæsious border, sporules black. *Turn. and Borr. Lich. Br. p.* 138.—*C. claviculare, Ach. Syn. p.* 57.—*Lichen clavellus, E. Bot. t.* 1465.

Frequent on boarded buildings, in England. Auchindeny, Scotland, *Dr. Greville.* — *Crust* greyish-white, spreading in wide but interrupted patches. *Stipes* straight, moderately long. *Apothecium* covered at first with a grey pellicle.

7. C. *hyperellum*, Ach. (*bright-yellow Calicium*); crust granulated somewhat tartareous, pilidia stipitate, capitulum nearly hemisphærical brownish-black, sporules fuliginous covering the

border. *Ach. Syn. p.* 59. *Turn. and Borr. Lich. Br. p.* 140. *Lichen hyperellus, Ach.—E. Bot. t.* 1832.

In the fissures of the bark of old trees, mostly upon oak, in Norfolk, Suffolk, and Sussex.— The colour of the crust is as bright as in *C. tigillare*, but the structure is different, and the *pilidia* nearly resemble those of the preceding species.

8. C. *chrysocéphalum*, Ach. (*gold-headed Calicium*); crust granulated bright greenish-yellow, pilidia (obconical) stipitate, capitulum slightly convex black with a thin elevated yellow border, sporules brown with a tinge of orange colour. *Ach. Syn. p.* 60. *E. Bot. t.* 2501. *Turn. and Borr. Lich. Br. p.* 143. *Schær. Lich. Helv. p.* 5.—*Lichen chrysocephalus, Turn. in Linn. Trans. v.* 7. *p.* 88. *t.* 8. *f.* 1.

On old pales, posts, and rails, Norfolk, Suffolk, and Sussex.— One of the most beautiful of this very pretty genus, differing remarkably from *C. hyperellum*, its nearest ally, in the form and especially in the colour of the *apothecia*.

9. C. *phæocéphalum*, Turn. and Borr. (*brown-headed Calicium*); crust granulated dark-brown, pilidia shortly stipitate, capitulum plano-convex brownish-black dotted with yellow pruina particularly at the thin erect border, sporules dark chestnut-brown. *Turn. and Borr. Lich. Brit. p.* 145.—*C. sæpiculare, Ach. Lich. Un.*—*Lichen trabinellus, E. Bot. t.* 1540, (*excl. syn.*)—*Lichen phæocephalus, Turn in Linn. Trans. v.* 7. *p.* 260. *t.* 6.

On boarded buildings. Barns at Bruisyard, Suffolk. Lakenham, Norfolk. Hurst Pierpoint, and Albourn, Sussex.— Very different from any other British species of this Genus. The bright greenish-yellow hue of the *apothecia*, arising from a kind of *pruina* or *bloom*, is most conspicuous in a dry state and with the aid of the microscope. The general colour of the whole plant is olive-brown, and it forms widely extended patches.

10. C. *chloréllum*, Ach. (*small greenish-headed Calicium*); crust filmy very thin whitish, pilidia stipitate, capitulum obconical covered with a yellow pruina, sporules olive-brown covering the border. *Ach. Syn. p.* 60. *Turn. and Borr. Lich. Br. p.* 146.—*C. trachilinum*, γ. *hispidulum, Ach. Syn. p.* 59.—*Lichen acicularis, E. Bot. t.* 2385, (*excl. syn.*)

On Elms and Oaks at Esher, Surrey, and Elms at Hurst Pierpoint, Sussex. Scotch Firs, near Bury St. Edmunds.— This has the smallest and most inconspicuous *pilidia* of all our *Calicia*. The yellow-green *pruina* is sometimes entirely rubbed off the *capitulum*, and the whole *pilidium* is then of a dark dull brown, the usual colour of the stipes; but sometimes the stipes is tinged with the green pruina.

11. C. *cúrtum*, Turn. and Borr. (*short-stalked Calicium*); crust very thin whitish, pilidia stipitate, stipes thickish upright, capitulum subcylindrical obovate or hemisphærical black, sporules black forming a loose prominent mass and covering the border. *Turn. and Borr. Lich. Br. p.* 148. *E. Bot. t.* 2503.— β. *populinum;* thallus white even, stipites slender, capi-

tula plano-convex with a slightly convex disk. *Turn. and Borr. l. c.*

Very common on decaying wood in shady places.—β. on Poplars, at Killarney, Ireland, *Sir T. Gage.*—Distinguishable from the preceding, to which, of all the British species, it is most nearly allied, by its stouter and straight *stipes* and wholly black colour.

12. C. *débile*, Turn. and Borr. (*slender Calicium*); crust filmy very thin white, pilidia stipitate, stipes slender flexuose, capitulum plano-convex black with a recurved margin, sporules black forming a slightly convex compact disk. *Turn. and Borr. Lich. Br. p.* 151.—*Lichen debilis, E. Bot. t.* 2462.—*Dill. Musc. p.* 78. *t.* 14. *f.* 3. A.?

On old timber, frequent under the eaves of thatched buildings.—When viewed under a glass, Messrs. Turner and Borrer observe that the perfect *pilidium* has precisely the appearance of a small black *Agaricus*, the *capitulum* being convex above and recurved and rounded at the edges. The *stipes* is incrassated at the base.

13. C. *sphærocéphalum*, Ach. (*round-headed Calicium*); crust filmy very thin greyish sprinkled irregularly with yellowish-grey powder, pilidia stipitate, capitulum subglobose rusty-brown with a narrow somewhat inflexed border, sporules black. *Ach. Syn. p.* 57. *Turn. and Borr. Lich. Br. p.* 153. *Schær. Lich. Helv. p.* 4. *n.* 8.—*C. salicinum, Pers. in Ust. Ann. v.* 7. *p.* 20. *t.* 3. *f.* 3.—*Lichen sphærocephalus, Web.*—*E. Bot. t.* 414.—*Dill. Musc. t.* 14. *f.* 3.—β. *crustosum;* covered with a pale greenish-yellow powder, forming an almost continuous crust.

On old wood, on the bark and in the hollow trunks of trees, in Norfolk, Suffolk, Sussex, and the North of England.—"Allied to *C. curtum*, and *C. debile*, but seeming to differ essentially from the former, by its longer *stipes*, and from both, by the colour of its *pilidia* and the powdery appearance of the *thallus*."

14. C. *æruginósum*, Turn. and Borr. (*Verdigris Calicium*); crust a very thin whitish film every where covered with powdery granulations of verdigris grey, pilidia stipitate, capitulum subglobose pruinose with a thin erect border, sporules blackish-brown pruinose. *Turn. and Borr. Lich. Br. p.* 156. *E. Bot. t.* 2502.—β. *cærulescens;* crust small, tumid patches of bluish-grey granulations, dispersed on a white film. *Turn. and Borr. l. c.*

Old pales near Bury, Suffolk, *Rev. G. R. Leathes.*—β. on the boards of a hovel near Cuckfield, Sussex.—Among the British *Calicia*, the present most approaches *C. hyperellum* and *C. sphærocephalum* β.; but the different and much duller colour of the *thallus* suffices to distinguish it at first sight. The second *var.*, it is observed in the Lich. Brit., resembles *C. clavellum* rather closely in the granulations of the *thallus*, and somewhat in the colour of the *pilidia;* but the latter are much more slender than in that species, and the *sporules* are not black.

15. C. *peronéllum*, Ach. Meth. (*cinnamon-headed Calicium*); crust a very thin film irregularly sprinkled with powder white, pilidia stipitate white, capitulum plano-convex, sporules flesh-

coloured covering the border. *Turn. and Borr. Lich. Br. p.* 158. *Winch, Bot. Guide, v.* 2. *p.* 42. (*Sm.*)—*C. cantharellum, E. Bot. t.* 2557. *Ach. Syn. p.* 61.—*C. stilbeum, Schær. Lich. Helv. p.* 4. *n.* 7.—*C. pallidum, Pers. in Ust. Ann. Fasc.* 7. *p.* 20. *t.* 3. *f.* 12.—*Lichen peronellus et C. cantharellus, Ach. Prod.*

On decayed wood near Egleston, Durham. *Northern Botanist's Guide.* —" Nothing can be more distinct from all that we have hitherto seen of the same genus. The *crust* is white, powdery, or, as Persoon says, downy, but very thin and evanescent. *Stipes* ascending, not very slender, of a light red-brown, clothed with white deciduous powder. *Heads* convex above and below, but not globose, their *disk* of a light reddish brown, or pale cinnamon-colour, clothed at first with a copious, dense, white powder, which after a while disappears." *Sm.*

16. C. *furfuráceum,* Pers. (*sulphureous Calicium*); crust powdery greenish-yellow, pilidia stipitate, capitulum globose at first closed and of the same colour as the crust at length bursting and then becoming covered entirely by brown sporules. *Pers. Tent. Disp. Fung. Suppl. t.* 60. *Turn. and Borr. Lich. Br. p.* 159. *Schær. Lich. Helv. p.* 6. *n.* 14.— *C. capitellatum, Ach. Syn. p.* 61.—*L. capitatus, Schreb.*—*E. Bot. t.* 1539.—*Mucor furfuraceus, Linn. Sp. Pl. p.* 1655.

Shady parts of broken sandy banks, often spreading over the roots of trees, occasionally on decaying wood, in various parts of the kingdom.— This remarkable and extremely pretty species forms a *section* of Acharius' *Calicium;* being distinguished by the *disk* of the *capitulum* swelling into a subglobose shape and surrounding the margin.

B. *Apothecia sessile.*

a. *Apothecia linear* (*lirellæ*). Pseudo-Hypoxyla.

Fam. III. Graphideæ.

3. Arthónia. *Ach.* Arthonia.

Thallus crustaceous, spreading, adnate, uniform, cartilagineo-membranaceous. *Apothecia* innately sessile, roundish, but varying in form, sometimes elongated, nearly plane, not bordered, black, covered by a subcartilaginous membrane, within subgelatinous, uniform.—Named from αρθω, to *sprinkle,* according to Acharius, because the numerous *apothecia* are, as it were, sprinkled over the crust:—but M. Feé justly remarks that αρδω (and not αρθω) is to *sprinkle,* and that therefore the name ought to be *Ardonia.* The *fructification* of this Genus, Mr. Borrer has observed to differ from that of *Opegrapha* by the absence of a proper margin to the *apothecia;* which latter too are less elongated, though very polymorphous, and not marked with a depressed line. Feé says that they are hard and almost horny in a dry state, but become soft and subgelatinous when they have absorbed moisture, which they do very readily. Hence, he remarks, that *Arthonia* is to *Graphis* (part of our *Opegrapha*)

with regard to its *apothecia*, what *Collema* is to the foliaceous *Lichens*, as respects the *thallus*. All are found on the bark of trees.

1. A. *impolíta*, Borr. (*pruinose Arthonia*); crust somewhat tartareous thin cracked uneven white, apothecia immersed flat confluent brownish lead-coloured pruinose, *Borr. in E. Bot. Suppl. t.* 2692. *f.* 1.—*Arthonia pruinosa, Ach. Lich. Univ. p.* 147. *t.* 1. *f.* 3. *et Syn. p.* 7.—*Lichen impolitus, Ehrh. Cr.* (*not E. Bot. which is probably taken from a common appearance of Spiloma gregarium,—S. tumidulum, Ach.,—of which a more perfect state is represented at t.* 2151. *Borr.*)—*Verrucaria impolita, Hoffm.*—*Parmelia impolita, Ach. Meth.*

Frequent on boarded buildings and on the rugged bark of old oaks.

2. A. *lúrida*, Ach. (*lurid Arthonia*); crust obsolete continuous smooth dull lead-coloured or brownish, apothecia sessile roundish slightly convex reddish-black. *Borr. in E. Bot. Suppl. t.* 2692. *f.* 2. *Ach. Syn. p.* 7.—*Spiloma paradoxum, Ach. Syn. t.* 3.

Probably not rare on bark, in shady places. On Holly and Oaks, Sussex, *Mr. Borrer*. Fir-trees in Ireland, *Sir Thomas Gage*.—The *crust* of this is so thin, that Mr. Borrer questions whether it is anything more in reality than a discoloration of the bark, and whether it has a just claim to rank among the *Lichens*. The synonym of *Acharius* Mr. Borrer has given upon the authority of original specimens in the Museum of the Linnæan Society.

3. A. *Swartziána*, Ach. (*Swartzian Arthonia*); crust thin cartilagineo-membranaceous cracked cream-coloured, apothecia roundish repand wavy and depressed uneven sometimes confluent. *Ach. in Schrad. N. Journ. v.* 1. *fasc.* 3. *p.* 13. *t.* 4. *f.* 1. *et Syn. p.* 5. *E. Bot. t.* 2079.

On the smooth bark of trees, Sussex, *Mr. Borrer*.—It is upon this species that the genus *Arthonia* was founded by Acharius. Other Lichens, which he has referred to it, should be separated from it in the opinion of other Botanists. I have followed Mr. Borrer's suggestion in removing *Arthonia lyncea* of Ach. to *Opegrapha*. The *A. astroidea* of Acharius, Mr. Borrer thinks is too nearly allied to this; but the species so called in *E. Bot.* he suspects rather to belong to *Opegrapha atra*.

4. Opégrapha. *Ach.* Opegrapha.

Thallus crustaceous, membranaceous or leprose, spreading, adnate, uniform. *Apothecia* (*lirellæ*) elongated, simple or branched, sessile or immersed, the *disk* narrow with a proper *border* and sometimes with an additional one derived from the thallus. —Named from οπη, *hollow*, and γραφη, *writing*: from its curious *lirellæ* resembling inscribed characters.—The character of this genus depends upon the elongated *apothecia* or *lirellæ*, with a raised proper border: and Mr. Borrer, whose arrangement and synonyms of the species, obligingly communicated to me, I entirely follow, includes also the *Graphides* of Acharius; considering

them as a section, only, of *Opegrapha*, with which they perfectly agree in appearance. "The *accessory border* to the *lirellæ*, more or less complete in different species, is but an unsatisfactory distinction, and the other characters assigned by the great Swedish Lichenist, are, if constant, too minute for general use." *Borr.*

* *Apothecia destitute of an accessory border.* (OPEGRAPHÆ veræ.)

1. O. *lýncea*, Borr. MSS. (*grey speckled Opegrapha*); crust white subtartareous even uniform, apothecia numerous depressed oblong curved rounded at each end somewhat immersed cæsio-pruinose with a black border.—*Arthonia lyncea, Ach. Syn. p.* 7.—*Lecidea lyncea, Ach. Meth.*—*Lichen lynceus, E. Bot. t.* 809.—*Opegrapha notha, γ. cæsia, Ach. Syn. p.* 76. (*Borr.*)

On the rugged bark of Oak.—This forms patches of considerable extent, spotted with the numerous oblong curved *apothecia*, whose rather broad *disk* is pruinose while the slightly raised *border* is black.

2. O. *epipásta*, Ach. (*smooth dotted Opegrapha*); crust very thin irregularly circumscribed smooth shining varying from grey to pale copper-colour, apothecia innate minute scattered somewhat parallel slightly convex oblong or roundish mostly simple with a narrow black edge. *Ach. Syn. p.* 74. *E. Bot. t.* 1828? (*Borr.*)—*β. microscopica;* crust coppery glossy, apothecia not unfrequently branched. *Ach.*—*O. microscopica, E. Bot. t.* 1911.—*Graphis microscopica, Ehrh.*

On the smooth bark of trees, especially of young oaks.—This is remarkable for its very thin smooth crust, and the minute dots of fructification.

3. O. *rubélla*, Pers. (*reddish Opegrapha*); crust continued limited reddish ash-coloured slightly rugged, apothecia short rounded somewhat curved their disk broader than the border. *Pers. in Ust. Ann. fasc.* 7. *p.* 31. *t.* 1. *f.* 2. *A. a. E. Bot. t.* 2347.—*O. herpetica, β. Ach. Syn. p.* 72.—*Lichen rubellus, Ach. Prodr. p.* 22.

On the trunks of large trees; communicated by *Mr. D. Turner*, to Engl. Bot.—*Crust* of a reddish smoky hue. *Apothecia* like dots, numerous, short, rounded-oblong, almost all separate, their disk black, flattened, at least as broad as the margins, frequently broader.

4. O. *ruféscens*, Pers. (*rusty Opegrapha*); crust cartilagineo-membranaceous pale ferruginous, apothecia innate variously shaped flexuose simple branched and substellated, the disk grooved nearly plane. (*Ach.*) *Pers. in Ust. Ann. fasc.* 7. *p.* 29. *t.* 2. *f.* 3. *A. a.*—*O. siderella, Ach. Syn. p.* 79.—*O. phæa? Ach. Syn. p.* 78.—*O. herpetica, Ach.? E. Bot. t.* 1789.

On the bark of trees, *Mr. Borrer*, who suspects that *O. herpetica, Ach.* and *E. Bot.* belongs rather to this than *O. rubella*, and who is by no means certain that the different *crust* and the *lirellæ* more sheathed by it ("*innate*") constantly distinguish *O. rufescens* from *O. atra.*

5. O. *átra*, Pers. (*black Opegrapha*); crust very thin membranous smooth whitish, apothecia sessile variously formed the smaller ones globose or oblong the larger very long narrow terete subrugulose flexuose coal-black simple or divided. *Pers. in Ust. Ann. fasc.* 7. *p.* 30. *t.* 1. *f.* 2. *C. c.* — *O. denigrata, Ach. Meth.* — *E. Bot. t.* 1753. — *O. stenocarpa, Ach. Syn. p.* 75., *and O. hapalea, p.* 79. — *O. astroidea? E. Bot. t.* 1347., (*not Ach.*) — *O. nimbosa, E. Bot. t.* 2346? (*not Ach.*)

On the smooth bark of trees. — "Perhaps *O. astroidea, E. Bot. t.* 1347, is a state of this, and distinct from *Arthonia astroidea, Ach.* Even this last is much like some young specimens of *O. atra.*"

6. O. *vulgáta*, Ach. (*common Opegrapha*); crust cartilagineo-membranaceous broken up into little scales somewhat even greenish-white, apothecia sessile variously formed the longer ones somewhat terete wavy and shining with a very narrow disk. *Ach. Syn. p.* 73. *E. Bot. t.* 1811?

In the clefts and hollows of the bark of trees. — "The more exposed *lirellæ* and the less considerable *crust* distinguish this from *O. rufescens;* and the less expanding *disk* (essentially?) from *O. varia.* I am in doubt whether *O. rimalis, Ach.* should be referred hither, or to *O. varia.*"

7. O. *betulína*, Pers.? (*Birch-bark Opegrapha*); "crust very thin dilated white bordered with black, apothecia mostly simple prominent linear with an extremely narrow disk." *Sm.—Pers. in Ust. Ann. fasc.* 7. *p.* 31. *t.* 3. *f.* 5. *A. a.*? *E. Bot. t.* 2281. —*Graphis betuligna, Ach. Syn. p.* 83?

On the smooth bark of the common Birch. — "I am not sure that this *E. Bot. Lichen* is the species of foreign authors, nor that it is distinct from *O. varia.*" These doubts are sufficiently confirmed, I should think, as far as Acharius is concerned, by his comparing this species with *O. scripta*, of which he considers it a *variety.*

8. O. *vária*, Pers. (*variable Opegrapha*); crust thin powdery white dispersed, apothecia sessile prominent scattered roundish and oval or oblong wavy, the disk plane at length convexo-hemisphærical somewhat tuberculose, the border subevanescent. *Pers. in Ust. Ann. fasc.* 7. *p.* 30. — *O. lichenoides, Pers. l. c. p.* 30. *t.* 2. *f.* 4. *a. b.* — *O. notha, E. Bot. t.* 1890. *Ach. Syn. with vars.* (excl. var. γ.) — *O. diaphora, E. Bot. t.* 2280. — *O. tridens, a., O. fulvella, and O. rimbosa? Ach. Syn.*

On the bark of trees. — "The *E. Bot. nimbosa* I cannot refer to any thing. Specimens from Mr. Turner, with this name, are, I think, *O. atra* in a spoiled state."

9. O. *saxátilis*, De Cand. (*stone Opegrapha*); crust tartareous pulverulent white often wanting, apothecia sessile slightly prominent minute roundish-oblong or linear very short often confluent into small roundish spots, disk concave, the margins flexuose and at length obliterated." *Dubis.* — *De Cand. Fl. Fr. v.* 2. *p.* 312. *Schær. Lich. Helv. p.* 49. *n.* 94. — *O. calcarea, E. Bot. t.* 1790. — *O. Persoonii, E. Bot. t.* 2345. — *O saxicola,*

O. lithyrga, O. calcarea, O. tridens, β. and O. Persoonii, (excl. var. c.) *Ach. Syn.*

On rocks, walls, sandstone, old mortar, &c. — Mr. Borrer thinks this should be united to *O. varia.* — See Mr. Borrer's remarks under *Opegrapha tesserata,* in *E. Bot. Suppl. t.* 2632. *f.* 2.

10. O. *cerebrína,* De Cand. (*tumid-crusted Opegrapha*); crust tartareous continuous very white, apothecia naked prominent short obtuse simple or variously divided and deformed their border broad inflexed at length expanding and obliterated. *Borr.—De Cand. Fl. Fr. v.* 2. *p.* 312. *Chev. Hist. des Hypox. p.* 57. *t.* 12. *f.* 4. *Borr. in E. Bot. Suppl. t.* 2632. *f.* 1.—*Lecidea plocina, Ach. Syn. p.* 16. — *Patellaria cerebrina, Dubis.*

Rare; on calcareous stone, *Mr. Dickson.* North of England, *Rev. J. Harriman.*—This appears to be a very little known *Lichen;* and, out of England, according to Mr. Borrer, only to have been found in the Pyrenees. Its *crust* is unequally thick, pure white. *Apothecia,* or *lirellæ,* full black, sometimes polished, not very numerous, mostly in clusters, occasionally solitary, at first oblong, or almost orbicular, with an inflexed, convex, even *border* closed over the *disk,* soon cloven at one or both ends, becoming triangular, quadrangular or more irregular in figure, and the border expanding and disclosing the *disk,* often so widely as to give to the *lirellæ* a close resemblance to an irregular *patellula,* with sometimes a prominent and crenulate, sometimes an obliterated *border.* Often, too, the *lirellæ* become confluent, and the clusters assume the appearance of the imperfect *tricæ* of a *Gyrophora:* — their base is sunk in the *crust* and even into the stone beneath. *Borr.*

11. O. *tesseráta,* De Cand. (*tessellated Opegrapha*); crust tartareous areolate brownish-grey, apothecia naked prominent short obtuse simple or slightly divided with a broad inflexed margin. *Borr.—De Cand. Fl. Fr. v.* 2. *p.* 313. *Chev. Hist. des Hypox. p.* 51. *t.* 11. *f.* 1. *Borr. in E. Bot. Suppl. t.* 2632. *f.* 2.—*O. petræa, Ach. Syn. p.* 72.

Rocks, Scotland, *Acharius.* On Holwick Scaur, by the Tees, Yorkshire, *Mr. W. Robertson.* — The *lirellæ* of this species considerably resemble those of *O. Persoonii,* but the urceolate *crust* distinguishes it at once both from that plant and from *O. saxatilis:* — " This *crust* forms patches of considerable extent, and is said to be bordered with a black line when perfect. It is of a structure, not uncommon in various genera of *Lichens,* but not hitherto observed in any other *Opegrapha,* being composed of granulations, at first scattered and convex, afterwards crowded together and forming small angular *areolæ,* irregular in shape and size, the interstices of which are barely visible to the naked eye; the general surface is rather uneven, unpolished, brownish-grey with a tinge of red, the internal substance white." *Borr.*

** *Apothecia with a raised accessory border formed of the crust.*

GRAPHIS. *Ach.*

12. O. *élegans,* Sm. (*elegant grooved Opegrapha*); crust orbicular granulated white, apothecia immersed scattered divaricated mostly simple with a grooved border and an accessory one formed of the crust. *Borr. in E. Bot. t.* 1812.—*Graphis elegans, Ach. Syn. p.* 85.

On the smooth bark of trees, Sussex, *Mr. Borrer.* — The proper *border* of the *lirellæ* of this species is very remarkable, having a deep longitudinal furrow, or being, as it were, itself a double border.

13. O. *scripta*, Ach. (*black-letter Opegrapha*); crust thin membranous more or less smooth somewhat shining greyish-white indistinctly bordered with black, apothecia partly immersed naked or pruinose flexuose simple or branched in a parallel direction subrimiform surrounded by an accessory raised border formed of the crust. *Ach. Lich. Univ. p.* 265. *Schær. Lich. Helv. p.* 46. *n.* 87—92. (*not E. Bot. according to Mr. Borrer, but*) *O. pulverulenta, E. Bot. t.* 1754., *O. Cerasi, t.* 2301., *and O. serpentina, t.* 1755.—*Graphis scripta, Ach. Syn. p.* 81.—*G. serpentina, Ach. Syn. p.* 83.

On the smooth bark of trees. — So sportive is this species that it is scarcely possible to define its limits: the *crust* is more or less smooth and shining, the *lirellæ* more or less branched, and the *disk* naked or pruinose. In the type of this species, the *a.* of Acharius, the *lirellæ* are naked and shining; in his *β.* the *O. pulverulenta*, Pers. and E. Bot., they are pulverulent, in the *γ.*, *O. cerasi*, E. Bot., the *lirellæ* are small and parallel with each other, mostly simple; and in the *O. serpentina* of E. Bot. the *crust* is tartareous and uneven, the *lirellæ* somewhat powdery, —and all intermediate states of these may be met with: in short, it would appear that almost all the European true *Graphides* may be referred to one and the same species.

*** *Apothecia with a raised accessory border formed of the crust, the proper border obsolete.* PLATYGRAMME. *Meyer.*

14. O. *Lyéllii*, Sm. (*white-bordered Opegrapha*); crust smooh membranous pale olive, apothecia prominent turgid crowded curved obtuse greyish and powdery destitute of proper border with an elevated white powdery accessory border formed of the crust. *E. Bot. t.* 1876., *and O. scripta, E. Bot. t.* 1813., (according to Mr. Borrer, but surely very unlike the plant.) — *O. marginata, Dubis, Bot. Gall. v.* 2. *p.* 643.—*Graphis Lyellii, Ach. Syn. p.* 85.—*Platygramme Lyellii, Meyer in Spreng.*—*Arthonia marginata, Dufour.*

On the rugged bark of trees, New Forest, Hants, *C. Lyell, Esq.*, in compliment to whom this most beautiful Lichen was named by Sir J. E. Smith.— It has very large and prominent *fructification*, pulverated and surrounded by the broad and much elevated powdery border of the crust.

15. O. *dendrítica*, Ach. (*Tree-like Opegrapha*); crust tartareous determinate very white somewhat powdery, lirellæ immersed depressed without any proper border repeatedly branched zigzag tapering at each end, partly covered by the elevated accessory border of the crust. *Ach. Meth. p.* 31. *t.* 1. *f.* 10. *E. Bot. t.* 1756.—*Graphis dendritica, Ach. Syn. p.* 83.—*Platygramme dendritica, Meyer in Spreng.*

Smooth bark of trees, Sussex, *Mr. Borrer.* New Forest, *Mr. Lyell.* — The English Bot. figure of this plant is very good and characteristic;

yet, well marked as it appears to be, Mr. Borrer observes that there are varieties most puzzlingly intermediate between it and *O. Lyellii.*

16. O. *venósa*, Pers. (*veiny Opegrapha*); crust tartareous determinate reddish-white, apothecia immersed convex without any proper border repeatedly branched curved parallel and equidistant obtuse at the ends, surrounded by a slightly elevated accessory border formed of the crust. *Pers. in Annal. der Wetterav. v. 2. p. 15. t. 10. f. 2. E. Bot. t. 2454.*

On the trunks of Beech in the New Forest, Hampshire, and almost always surrounded by *Pertusaria crassa, C. Lyell, Esq.* — Sir Jas. E. Smith well describes "the *lirellæ* as curiously and regularly disposed, much branched, twisted; but their ramifications, however complex and varied, keep generally at equal distances from each other, like the walls of an artificial maze. They are deep sunk in the crust, but convex above, intensely black with obtuse terminations; not tapering to a point, as in *O. dendritica*, nor do they, as in that, spread radiating from a centre." Mr. Borrer, in a letter, doubts the correctness of the reference to Persoon; but although it must be confessed that his short description is very unsatisfactory, the figure seems to be sufficiently characteristic. The same acute observer has already, in E. Bot. Suppl., under *Arthonia impolita* (*t.* 2692.), remarked that "Meyer has perhaps done well in placing *O. dendritica* and *O. Lyellii* in a new Genus, his *Platygramme*, to which our *O. venosa* also must belong. They appear to differ from *Opegrapha* by wanting a proper border to the *apothecia* and they can scarcely be placed in *Arthonia*." Most of the species referred to *Platygramme* by Sprengel are exotic, natives of China. Our own 3 species appear to prefer the warmer parts of Europe, and in Britain they inhabit the southern districts only.

Obs. The *Opegrapha macularis* of Ach. and *O. epiphaga* of *Ach.* and *E. Bot.*, are altogether to be excluded from the *Lichens*, as species of *Hysterium.* (*Borr.*) M. Feé, however, still ranks them among the *Lichens*, and in the present family, forming of them a Genus which he calls *Heterographa.*

b. *Apothecia hemisphærical* (*tubercula*), *enclosing a nucleus.*

Fam. IV. Verrucarieæ.

5. Verrucária. *Pers.* Verrucaria.

Thallus crustaceous or cartilagineo-membranaceous, spreading, adnate, uniform. *Apothecia* (*tubercula*) hemisphærical or subglobose, innate and immersed or sessile, corneous, of a different colour and substance from the *thallus*, (mostly a black crust or shell) enclosing a *nucleus*, the apex papillary, often at length perforated, sometimes covered by the wart-like processes of the *thallus*, (when it constitutes the *Pyrenula*, Ach.)—Name: *verruca*, a *wart*, from the wart-like processes on the thallus. —The characters of this genus are not satisfactorily defined. *Pyrenula*, separated from it by Acharius, is, by almost general

consent, now combined with it again. Mr. Borrer goes farther and unites with it the Genus *Endocarpon*, and even thinks that the Acharian *Porina* (*Pertusaria*, *D C.*) should not be kept distinct. His character, as given in the Supplement to *E. Bot.*, runs thus; "*Tubercles* of a different substance from the *thallus*, simple, convex, not expanding, but furnished with a central pore and inclosing a somewhat gelatinous *nucleus*."

* *Growing on the bark of trees.* Corticolæ.

1. V. *nítida*, Schrad. (*Wax-like Bark Verrucaria*); crust determinate somewhat tartareous continuous smooth waxy brown marked with minute pale dots and swelling about the tubercles, apothecia rather large hemisphærical black immersed, at length partially exposed. *Borr.*—*Schrad. in Journ.* 1801, *fasc.* 1. *p.* 79. *Borr. in E. Bot. Suppl. t.* 2607. *f.* 1. *Schær. Lich. Helv. p.* 57. *n.* 111.—*Pyrenula nitida*, *Ach. Syn. p.* 125.—*Sphæria nitida*, *Weig.*—*Sow. E. Fungi*, *t.* 275.

Frequent on smooth bark, particularly that of the Ash.

2. V. *dermatódes*, Borr. (*Vellum-like Bark Verrucaria*); crust determinate between filmy and tartareous continuous very smooth cream-coloured swelling about the tubercles, apothecia hemisphærical black immersed at length exposed. *Borr. in E. Bot. Suppl. t.* 2607. *f.* 2.

Trees in Ireland; near Bantry, *Miss Hutchins*, and near Killarney, *Sir T. Gage*, *Bart.*—Miss Hutchins observes that the living plant is constantly suffused with a reddish tinge, probably of an extraneous nature, of which some traces remain on Mr. Borrer's long-dried specimens.—"Allied, at first sight, to *V. epidermidis* as it usually grows on Birch-trees, or to a variety of it which spreads over the trunks of young Ash-trees; but in the real nature of the *crust* it more resembles *V. nitida*, although not in the structure of its *tubercles*, the shell of which does not, as in that, inclose the base of the *nucleus*; but the colour and remarkable vellum-like appearance of its thinner and polished *crust* and the entire want of dots distinguish it." *Borr.*

3. V. *cinérea*, Pers. (*greyish Bark Verrucaria*); crust greyish uninterrupted thin smooth and polished swelling about the tubercles, apothecia minute convex black protruding through and elevating the crust.—*V. stigmatella*, *Ach. Syn. p.* 89.—*Lichen stigmatellus*, *E. Bot. t.* 1891. *Pers. in Ust. Ann. fasc.* 7. *p.* 28. *t.* 3. *f.* 6. A.

On the smooth bark of trees, New Forest, Hants, *C. Lyell, Esq.*

4. V. *epidérmidis*, Ach. (*Birch-Bark Verrucaria*); crust very thin spreading cream-coloured, apothecia black very minute roundish convex the circumference depressed with an hemisphærical point in the centre. *Ach. Syn. p.* 89. *Schær. Lich. Helv. p.* 56. *n.* 107, 108.—*β. analepta*; crust olive-coloured inclining to coppery, apothecia elevated hemisphærical scattered black with a central dot. *V. analepta*, *Ach. Syn. p.* 88.—*Lichen analept.*, *E. Bot. t.* 1848.

a. On the thin epidermis of the Birch. *β.* on the smooth bark of young Oaks in Sussex, *Mr. Borrer*, who now considers it a *variety* of *V. epidermidis.*

5. V. *punctifórmis,* Pers. (*brownish Bark Verrucaria*); crust determinate very thin smooth continuous rusty-brown, apothecia very minute black hemisphærical umbilicated. *Ach. Syn. p.* 87. — *Lichen punctif., E. Bot. t.* 2412.

Smooth bark of Ash-trees, *Mr. Borrer.* — Closely allied to *V. epidermidis, β. analepta;* but the *crust* is of a more reddish-brown or rusty hue, the *apothecia* are still more minute and so much umbilicated as to be occasionally almost cup-shaped.

6. V. *olivácea,* Pers. (*olive-crusted Bark Verrucaria*); crust determinate filmy continuous or slightly cracked roughish olive-green, apothecia prominent hemisphærical or somewhat conical black slightly rugose, the crust rising about their base or investing the whole surface. *Borr.—Pers. in Ust. Ann. fasc.* 7. *p.* 28. *p.* 3. *f.* 6. *B. a. b. Borr. in E. Bot. Suppl. p.* 2596. *f.* 1. — *V. carpinea, Ach. Syn. p.* 88.

On the smooth trunks of Thorns, Ash-trees, &c., *Mr. Borrer*, who remarks that it is indeed closely allied to *V. epidermidis*, and differs from it chiefly by the more considerable and somewhat rugged *crust.*

7. V. *rhypónta,* Ach. (*black-stain Bark Verrucaria*); crust roundish filmy continuous roughish as if minutely flocculose black, apothecia very minute prominent hemisphærical black for the most part slightly rugose. *Borr. — Ach. Syn. p.* 89. *Borr. in E. Bot. t.* 2597. *f.* 2.

On the trunks of young trees, New Forest, Hants, *C. Lyell, Esq.* Sussex, *Mr. Borrer.* — It grows parasitically on *Opegrapha scripta*, or rather, to all appearance, Mr. Borrer observes, it is formed beneath the crust of that plant and gradually bursts through and destroys it in little stain-like spots. The less spreading *thallus* and the more minute *tubercles* seem to distinguish this little plant from *V. olivacea;* yet Mr. Lyell has found on Beech bark, in the New Forest, a dark olive-crusted *Verrucaria*, nearly intermediate in both respects.

8. V. *gemmáta,* Ach. (*large-fruited Bark Verrucaria*); crust indeterminate almost filmy continuous or somewhat cracked nearly smooth whitish, apothecia large prominent hemisphærical or deformed naked or invested with a very thin film. *Borr. — Ach. Lyn. p.* 90. *Purt. Fl. v.* 3. *p.* 162. *Borr. in E. Bot. t.* 2617. *f.* 2. — *V. alba, Schrad. — Schær. Lich. Helv. p.* 55. *n.* 105.

Frequent on the trunks of trees, especially of Ash. — The largest of the British *Verrucariæ* growing on bark, if we except the *V. nitida;* but most allied to the following species.

9. V. *bifórmis,* Borr. (*deceptive Bark Verrucaria*); crust indeterminate filmy continuous or sparingly cracked slightly rugose or smooth or somewhat powdery greyish, apothecia small prominent hemisphærical invested with a thin film. *Borr. in E. Bot. Suppl. t.* 2617. *f.* 1. *Schær. Lich. Helv. p.* 57. *n.* 109.

Not unfrequent on young Oaks, sometimes on Ash and other trees. *Mr. Borrer.* — "An obscure and puzzling lichen; in some states ap-

proaching to *V. olivacea,* although the white crust and broken appearance of the older tubercles tolerably well distinguish it. From *V. cinerea,* the latter character and the thicker shell and greater protuberance of the *apothecia,* will keep it separate, without adverting to the difference of crust. It very closely resembles *V. gemmata;* but the *tubercles* do not attain half the size usual in that species, although they seem liable to all the same variations in figure, except perhaps that they never become mammillated; their *shell* also passes under the base of the *nucleus,* which does not appear to be the case in *V. gemmata.*" *Borr.*

10. V. *niveo-átra,* Borr. (*snowy-crusted Bark Verrucaria*); crust indeterminate thin rugose somewhat powdery white, apothecia very minute orbicular half-immersed their apex naked depressed rugose. *Borr. in E. Bot. Suppl. t.* 2637. *f.* 1.

On old timber, in the wall of a house at Bamber, and on Elms at Portslade, Sussex, *Mr. Borrer.* Hengrave, Suffolk, *Sir T. Gage.*— This differs in its crust from *V. biformis,* the *tubercles* of that plant are also larger and of a different structure.

11. V. *rúdis,* Borr. (*rugged Bark Verrucaria*); crust indeterminate somewhat gelatinous thin continuous uneven with granulations grey or blackish, apothecia very minute prominent irregularly sphærical very rugged dull black. *Borr. in E. Bot. Suppl. t.* 2637. *f.* 2.

On boarded buildings and on rugged Oaks, Hurst-pierpoint and Albourne, Sussex, and at Esher, Surrey, *Mr. Borrer.*— This obscure production is known from *V. niveo-atra* by tbe colour and texture of its *crust* and more dingy hue of its *tubercles,* as well as the more generally conspicuous *nucleus.* It has some affinity with *V. leucocephala* in the structure of the tubercle, the shell being thinner and apparently softer than in the generality of the crustaceous *Verrucariæ,* and small imperfect patches are so intermixed with all our specimens of *V. rudis* upon bark, as almost to lead to a suspicion that the two are not really distinct. Yet the tubercles are not powdered, nor do they partake at all of the tendency to a cylindrical figure, so observable both in the denudated state and in the more common appearance of *V. leucocephala;* and they differ farther by their minute size, rugged surface and hardly discoverable orifice; the nature of the crust, too, seems dissimilar. To distinguish *V. rudis* in its palest state from *V. biformis* and *V. olivacea,* it is only necessary to advert to the more even crust and the larger and more distinctly perforated tubercles of both those species. *Borr.*

12. V. *áphanes,* Borr. (*inconspicuous Bark Verrucaria*); crust indeterminate very thin continuous minutely rugose olive, apothecia very minute nearly globose covered with a pale olive powder. *Borr. in E. Bot. Suppl. t.* 2642. *f.* 1.

Probably not unfrequent, on old Elms, Henfield, Sussex, and near Yarmouth.— This is rendered visible to the naked eye only by a dull dark olive tinge, so that it may well have been passed over as the mere surface of the bark. Different in appearance as are the figures of these two species, given in *E. Bot. Suppl.,* yet Mr. Borrer observes that " the powdery surface of the tubercles of the present one seems to indicate an affinity between this most inconspicuous little lichen and the following, and the state of our knowledge of these obscure vegetables is by no means such as to warrant a positive assertion that it is not an infant state of that species, in the company of which we have hitherto found

it growing. Yet the structure of the crust seems very different, as well as the colour both of that part and the fructification." — The tubercles are much more minute than those of any other British *Verrucaria.*

13. V. *leucocéphala*, Ach. (*white-fruited Bark Verrucaria*); crust between filmy and tartareous grey pruinose, apothecia largish prominent sphærical or almost cylindrical brown covered with white powder their apex at length bare. *Borr.* — *Ach. Meth. p.* 116. *Borr. in E. Bot. Suppl. t.* 2642. *f.* 2. — *Pyrenula leucocephala, Ach. Syn. p.* 126. — *Cyphelium leucocephalum,* "*Ach. in Stockl. Trans. for* 1817, *p.* 226. *t.* 8. *f.* 7." — *Sphæria leucocephala, Ehrh. and Pers.* — *S. lichenoides, Sow. Br. Fungi, t.* 373. *f.* 12. — *β. amphibola;* apothecia larger clustered often irregular. *Ach. Syn.*

On the trunks of old trees, near the ground. — Among the *tubercles,* as they appear to Mr. Borrer, of this plant, Mr. Lyell and Mr. Robertson find *patellulæ* of a dull purplish-black, covered with an inseparable superficial buff powder. The same *patellulæ* occur on sandstone rocks in Sussex, intermixed with what may possibly be abortive tubercles of the *Verrucaria.* These are figured on the plate in *E. Bot. t.* 2642. *f.* 2. *c.*, and look externally very much like the fructifications of a *Lecanora.* But whilst Mr. Borrer knows of no other Lichen to which these *patellulæ* can be referred, he yet believes that they do not belong to our *Verrucaria.*

** *Growing on rock or stone.* Saxicolæ.

14. V. *rupéstris*, Schrad. (*immersed Rock Verrucaria*); crust indeterminate very thin whitish smooth, apothecia small black globose umbilicate sunk in a hollow of the crust and of the stone. *Schrad. Spicil. p.* 109. *t.* 2. *f.* 7. — *V. Schraderi, Ach. Syn. p.* 93. — *Lichen Schrad.* — *E. Bot. t.* 1711. *Schær. Lich. Helv. p.* 55. *n.* 103, 104. — *Verrucaria immersa, Hoffm. Pl. Lich. t.* 12. *f.* 2—4?

On chalk and calcareous stone, in which the *apothecia* form cavities often larger than themselves. — Mr. Borrer suggests that the *V. immersa* of Hoffm. should be distinguished from this, and he observes that both appear to have grown intermixed, as they frequently do on chalk, in the specimen figured as *Lichen Schraderi* in *E. Bot.* But I am not aware of the essential differences between them.

15. V. *concínna*, Borr. (*neat Rock Verrucaria*); crust determinate very thin tartareous continuous even grey somewhat pruinose, apothecia of a middle size prominent hemisphærical umbilicate black. *Borr. in E. Bot. Suppl. t.* 2623. *f.* 1.

Durham, *Mr. Robson.* Limestone rocks on the Durham shore of the Tees, near Eglestone; and on chalk on the Sussex Downs, *Mr. Borrer.* Killarney, *Sir T. Gage.* — This differs from the *V. rupestris* by its limited and even *crust* and its more prominent and larger *tubercles.*

16. V. *elæína*, Borr. (*olive-green Rock Verrucaria*); crust thin tartareous cracked smooth slightly tumid above the tubercles greenish-olive, apothecia small immersed black between hemisphærical and conical at length emerging. *Borr. in E. Bot. Suppl. after t.* 2623. *f.* 2. — *Lichen viridulus, E. Bot. t.* 2455. (excluding the synonyms).

On fissile slate rocks, in shady situations in the west of Ireland, *Miss Hutchins.* — The black *apothecia* burst through an irregular star-like crack in the crust and rise above the surface.

17. V. *lævàta*, Ach. (*greyish Water Verrucaria*); crust thin tartareous cracked smooth dirty-white or brownish-grey, apothecia small partially emerging somewhat conical black. *Ach. Syn. p.* 94. *Borr. in E. Bot. Suppl. t.* 2623. *f.* 2.

Rocky beds of streams in mountainous districts, in the north of England, *Mr. Teesdale, Rev. J. Harriman.* Killarney, *Sir T. Gage.*

18. V. *Harrimáni*, Ach. (*Mr. Harriman's Rock Verrucaria*); crust tartareous continuous limited mouse-coloured with very minute depressed dots, apothecia minute immersed globose with a prominent bordered orifice dirty white within. *Sm.*—*Ach. Syn. p.* 93.—*Lichen Harrimani, E. Bot. t.* 2539.

On hard grey calcareous rocks, in Durham, *Rev. J. Harriman.*—"Its patches, though inseparable from the stone, are very distinctly limited and visibly prominent above its surface, of a hard tartareous texture, white within, greyish or pale mouse-coloured on the outside, which is thickly besprinkled with innumerable depressions or dots. The *tubercles* are deep sunk in the *crust*, blackish, their little *bordered* orifices only projecting slightly above its level." *Sm.*

19. V. *plúmbea*, Ach. (*lead-coloured Rock Verrucaria*); crust tartareous minutely cracked and rugged lead-coloured limited, apothecia half-immersed globose black pale within. *Sm.*—*Ach. Syn. p.* 94. *Schær. Lich. Helv. p.* 54. *n.* 102.—*Lichen plumbosus, E. Bot. t.* 2540.

Limestone rocks, near Cheddar, Somersetshire, *Mr. Borrer.* "This species differs sufficiently from *V. Harrimani;* not so much in the bluer colour, as in the tessellated configuration of its *crust*, which moreover is destitute of minute dots.

20. V. *Gágei*, Borr. (*Gagean Rock Verrucaria*); crust continued calcareous smooth brownish-white irregularly cracked when dry, apothecia very minute blackish sunk in the crust. *Sm.—Lichen Gagei, E. Bot. t.* 2580.

Rocks of Glena and Glen Flesk, near Killarney; but not common.—Sir Jas. E. Smith referred this to the Acharian Genus *Urceolaria:* but Mr. Borrer ranks it with *Verrucaria.*

21. V. *virídula*, Ach. (*Mosaic Rock Verrucaria*); crust of polygonal granulato-crenate scales thickish tartareous rugose greenish olive-brown, apothecia largish black partially immersed conical. *Borr.—Ach. Lich. Univ. Add. p.* 675. *Borr. in E. Bot. Suppl. after t.* 2623. *f.* 2.—*Endocarpon viridulum, Schrad. Spicil. p.* 192. *t.* 2. *f.* 4.—*Pyrenula tessellata, Ach. Syn. p.* 126. —*Lichen tessellatus, E. Bot. t.* 533. (*bad as to figure and description.*)

On bricks and tiles.—A common and very variable species, which has been involved in much obscurity; partly on account of the indifferent and unsatisfactory figure and description given in *E. Bot.* under the name of *Lichen tessellatus*, and partly because Acharius had considered the plant as a *var.* of the *Lichen fuscellus* of *Turn.* and *E. Bot. t.* 1500.

22. V. *murális*, Ach. (*wall Verrucaria*); crust indeterminate composed of thin scattered or confluent scales between pulverulent and tartareous pale grey, apothecia prominent nearly globose unpolished umbilicate. *Borr.—Ach. Syn. p.* 95. *Borr. in E. Bot. Suppl. t.* 2647. *f.* 2.— *Sphæria muralis, Sow. E. Fungi, t.* 295, *upper figure.*

Upon walls, chiefly on the mortar.—Allied to *V. rupestris;* but its scarcely perceptible *crust* is less continuous and its *tubercles* not so deeply immersed and less regular in figure, as well as usually larger. Mr. Borrer likewise compares it to a state of *V. viridula* when injured by insects; "but the proper state of the surface of that plant is almost always to be traced in some parts of the patch, and its tubercles are larger and more conical. Still the most experienced Lichenists will not, perhaps, be the most forward to decide whether these two productions be truly distinct species."

23. V. *epipoléa*, Ach. (*large-fruited Rock Verrucaria*); crust indeterminate thin tartareous somewhat powdery greyish, apothecia large prominent mostly conical brownish-black pruinose. *Borr.—Ach. Syn. p.* 285. *E. Bot. t.* 2647. *f.* 3.

St. Vincent's Rocks, Bristol, *Mr. Borrer.* North of England, *Mr. Brunton*, and the *Rev. J. Harriman.* Wales, *Rev. H. Davis.* Ireland, *Sir Thomas Gage.*—This is so nearly allied to *V. gemmata* of the preceding section, having equally large *tubercles*, that Mr. Borrer observes it might be supposed a mere "varietas loci;" yet its more tartareous *crust*, with a powdery surface, and its rugose, brownish, less variable *tubercles* afford, perhaps, constantly distinctive marks. Its larger tubercles and continuous crust distinguish it from *V. muralis.*

24. V. *trachóna*, Ach. (*green Rock Verrucaria*); crust indeterminate thin between pulveraceous and tartareous continuous or slightly cracked greyish-green, apothecia small prominent nearly globose pruinose at length deformed. *Ach. Syn. p.* 96. *Borr. in E. Bot. Suppl. t.* 2647. *f.* 1.

Slaty rocks in different parts of Ireland, *Miss Hutchins* and *Sir T. Gage.*—The general aspect of this Lichen is so much like *Lepraria botryoides, E. Bot.*, not *Ach.*, (the *Chlorococcum vulgare*, Grev.) that it might easily be mistaken for that plant, somewhat faded and sprinkled with a minute parasite. Under a glass, however, the *crust* is found to be thinner and more coherent than that formed by the "*propagula*" of the *Lepraria*, and the *tubercles* seem really to belong to it."

25. V. *maúra*, Ach. (*Black-moor Rock Verrucaria*); crust thin continued imperfectly circumscribed coal-black smooth with innumerable minute cracks, apothecia black immersed swelling under the crust and marked by an umbilicated dot. *Sm.—Ach. Syn. p.* 95.—*Lichen maurus, E. Bot. t.* 2456.

Frequent on the Scottish coast, on a reddish porphyritic sandstone, by the sea. First noticed at Dunbar by *Mr. Borrer.*

26. V. *nigréscens*, Pers. (*dark-stained Rock Verrucaria*); crust of a deep olive-black solid most minutely cracked, apothecia of the same colour half-immersed slightly convex with a central pore. *Sm.—Pers. in Ust. Ann.* 14. *p.* 56.—*Pyrenula*

nigrescens, Ach. Syn. p. 126.—*Verrucaria umbrina, Ach. Meth. p.* 122.—*Lichen umbrinus, Ach. Prodr.*—*E. Bot. t.* 1499.

Common on shady rocks and stone walls, even about houses.

27. V. *striátula*, Ach. (*sharp-tubercled Rock Verrucaria*); crust defined dendritic greenish-black limited with the areolæ somewhat separated imperfectly branched radiating, apothecia cone-shaped at length slightly concave and margined at the extremity, the nucleus punctiform and transparent. *Ach. Syn. p.* 95.—*β. acrotella ;* crust scarcely any, apothecia minute scattered somewhat confluent black unequal convex pointed umbilicated. *Sm.*—*V. acrotella, Ach. Meth. p.* 123.—*Lichen acrotellus, E. Bot. t.* 1712.

β. On flint-stones, Sussex, *Mr. Borrer.*

*** *Growing on earth or decayed mosses.* Terricolæ.

28. V. *Hookéri*, Borr. (*Hookerian Ground Verrucaria*); crust thick of pure white tumid tartareous scales covering a black spongy substance, apothecia ampulliform black immersed except the conical or truncated apex. *Borr. in E. Bot. Suppl. t.* 2622. *f.* 2.

On dead mosses, on the micaceous soil of Ben Lawers, in the hollow near the summit where *Saxifraga cernua* grows, *Mr. Borrer.* Also in similar situations in Maelgreadha and the other Breadalbane mountains, not unfrequently growing on the bare soil composed of comminuted schist.—This, Mr. Borrer observes, "is very unlike any other *Verrucaria* with which we are acquainted, both in its *thallus* and *fructification.* The thick, turgid, somewhat lobed, tartareous scales are similar in figure to those of *Lichen frustulosus, E. Bot. t.* 2273., but of a much smaller size : their internal substance is green."

29. V. *epigæa*, Ach. (*greenish Ground Lichen*); crust pale yellowish-green or grey somewhat fibrillose slimy when moist, apothecia minute globose immersed black within and with a minute point. *Ach. Syn. p.* 96. *Schær. Lich. Helv. p.* 56. *n.* 106.—*Sphæria epigæa, Pers. Syn. Fung. App. p.* 27.—*Lichen terrestris, E. Bot. t.* 1681.

On dry barren banks, near Norwich, *Rev. G. R. Leathes.*

6. Endocárpon. *Hedw.* Endocarpon.

Thallus crustaceous, often lobed or foliaceous. *Apothecia* globose, imbedded in the *thallus*, with a slightly prominent apex and including a *nucleus.*—Name; ενδον, *within*, and καρπος, the *fruit*, from the situation of the fructification.—The limits of this genus are not well understood, nor its situation among the Lichens. If we consider the nature of the *apothecia*, it will undoubtedly rank near to *Verrucaria*, with which Mr. Borrer unites it; but then the *thallus* is in general of a widely different nature, scaly, coriaceous or foliaceous, not unfrequently peltate and umbilicated. Some of the species flourish upon constantly dripping rocks, within the spray of waterfalls, which is contrary to the habit of Lichens in general ; hence, and on account of the

deeply immersed fructification, the Genus has been considered to be a connecting link with the *Hepaticæ*, through the Genus *Riccia*. M. Feé places it apart from the true Lichens, in a section which he calls *Pseudo-Hepaticæ*, and which he characterizes by an entirely "globose immersed *apothecium* and a coriaceous or foliaceous *thallus*." These *apothecia* are so much at variance with those of the other foliaceous Lichens, that I have preferred arranging the Genus next to *Verrucaria*, although many of its species have not "*the thallus crustaceous, adherent and amorphous.*" The attentive student of Nature will meet with difficulties such as these at every step, in attempting to arrange her works according to a system of his own.

1. E. *miniátum*, Ach. (*grey cloudy Endocarpon*); thallus foliaceous coriaceous subumbilicated variously and broadly lobed olive-grey tawny beneath. *Schær. Lich. Helv. p.* 59.—*α. umbilicatum;* umbilicate simple spreading and lobed. *Schær. Lich. Helv. p.* 59. *n.* 112.—*E. miniatum, Ach. Syn. p.* 101.—*Lichen miniatus, Linn. Sp. Pl. p.* 1617. *E. Bot. t.* 593.—*β. complicatum;* subumbilicate cæspitose polyphyllous, the lobes imbricated erect. *Schær. Lich. Helv. p.* 59. *n.* 113.—*E. complicatum, Ach. Syn. p.* 102.—*Lichen miniatus, β. amphibius, With.*—*E. Bot. t.* 593?—*γ. aquaticum;* cæspitose polyphyllous, the lobes crowded in the middle convolute, the exterior spreading and cut. *Schær. Lich. Helv. p.* 60. *n.* 114.—*E. Weberi, Ach. Syn. p.* 102.—*Lichen aquaticus, Weis.*—*E. Bot. t.* 594.

On rocks. *α.* On such as are perpendicular and dry. *β.* On rocks suffused with water or within reach of the spray of cascades. *γ.* On stones or rocks under water, in subalpine rivulets.—I cordially coincide with my valued friend, the Rev. Mr. Schærer, in uniting the three species, as these have been considered, into one; and indeed, I had hinted at the propriety of doing so, in the *Flora Scotica*, many years ago. The plant is most variable, depending for many of its appearances upon moisture and exposure. When dry, it often assumes a reddish or tawny hue with a minute powdery covering, especially the *var. α.*:—but, when moist, the colour is usually an olive-green.

2. E. *Hedwígii*, Ach. (*Hedwigian Endocarpon*); thallus a subcartilaginous scattered flat somewhat lobed and angled greyish-brown scale pale at the margin at length blackish fibrillose, points of the apothecia protruded brownish-black. *Ach. Syn. p.* 99. *Schær. Lich. Helv. p.* 61. *n.* 115.—*Lichen trapeziformis, Dicks.*—*E. Bot. t.* 595.—*β. lachneum;* lobes of the thallus aggregated somewhat imbricated, the margin elevated repando-lobate waved beneath black and woolly. *Ach. Syn. p.* 99.—*E. lachneum, Ach. Lich. Univ. p.* 290.—*Lichen lachneus, Ach. Prodr. p.* 140. *E. Bot. t.* 1698.—*γ. squamulosum;* lobes of the thallus aggregate sub-imbricated lobato-crenate pale fibrillose and woolly beneath. *Ach. Syn. p.* 99.—*Lichen leptophyllus, E. Bot. t.* 2012. (excluding the synonyms).

α. On barren heaths near Croydon, *Mr. Dickson;* and in Norfolk, *Mr. D. Turner.* *β.* Common on the Sussex downs, and on rocks at

Cheddar and Bristol Hot-wells, *Mr. Borrer.* γ. Hill of Kinnoul, near Perth, and other places in Scotland.—This varies much in colour and a good deal in form, and constitutes, with the following five species, a little groupe, which might, as it appears to me, be considered as states of one and the same species, without much violence to nature.

3. E. *pállidum*, Ach. (*pale-leaved Endocarpon*); thallus foliaceous somewhat imbricated lobed crenate pale greenish-grey slightly spongy and black beneath the outermost lobes pale and naked on the underside, apothecia immersed black. *Sm.*—*Ach. Syn. p.* 100.—*Lichen pallidus, E. Bot. t.* 2541.

On rocks thinly covered with earth, Ireland, *Sir Thomas Gage.*—This Mr. Schærar unites with *E. Hedwigii.*

4. E. *psoromoídes*, (*bark Endocarpon*); scales between tartareous and leafy small crowded somewhat imbricated appressed lobed waved tumid olive-green with slightly elevated crenate whitish downy edges underside black and spongy, apothecia immersed nearly globular pale except the slightly prominent blackish-brown apex.—*Verrucaria psoromoides, Borr. in E. Bot. Suppl. t.* 2612. *f.* 1.

Probably rare. On Elm bark at Hurst-pierpoint, and on Ash at Beeding, Sussex.—With the exception of *E. pulchellum*, no other *Endocarpon* has been observed to grow on trees. It differs, Mr. Borrer tells us, from its nearest affinity, *E. pallidum*, in its less truly imbricated and more appressed mode of growth, the edges only of the scales being slightly raised; in the really fibrous texture of the underside; and, in some degree, in the figure of the scales and incisions of the edges; and not less in the tubercles. "These, in the present species, have in the immersed part a thin perithecium, of no darker colour than the nucleus; such, we presume, as Acharius held essentially characteristic of a genuine *Endocarpon;* whilst those of *E. pallidum* have, in every part, a thick black shell. In this respect *E. sorediatum* agrees with *E. pallidum:* and it further differs from *E. psoromoides* by the peculiar *apex* of its *tubercles*, by the larger scales of its *thallus*, and their much more downy or rather spongy edges."

5. E. *leptophýllum*, Ach. (*small-leaved Endocarpon*); thallus cartilaginous foliaceous orbicular peltate blackish-brown or inclining to grey, the circumference spreading flexuose, beneath smooth and naked wrinkled subplicate and black, points of the apothecia black somewhat prominent. *Ach. Syn. p.* 102.—*Lichen leptophyllus, E. Bot. t.* 2012. *f.* 2. *only*, (*according to Mr. Borrer*).

Rocks by the shore of Loch Lomond, *Mr. Borrer.* Rocks by Bassenthwaite water, Cumberland, *Mr. Robertson.*

6. E. *eúplocum*, Ach. (*curled peltate Endocarpon*); a coriaceous peltate leaf deeply lobed with jagged curled recurved edges naked on both sides olive-green above tawny beneath, apothecia immersed nearly globular pale except the slightly prominent apex. *Borr.*—*Ach. Syn. p.* 102.—*E. miniatum*, β. *pusillum, Wahl. Lapp. p.* 462.—*Verrucaria euploca, Borr. in E. Bot. Suppl. t.* 2602. *f.* 2.

On sandstone, exposed to the tide by the Tyne, a little to the west of Newcastle, *Mr. W. Robertson.* "The deep, laciniated lobes and the

colour of the underside, distinguish this plant from *E. leptophyllum;* yet so closely is it allied to that species, that the propriety of separating it may admit of doubt: both are fixed by a central callus and are destitute of fibres on the underside." *Borr.*

7. E. *sorediátum, (powdery-speckled Endocarpon)*; scales between tartareous and leafy rather wide mostly scattered appressed flat irregularly orbicular lobed olive-green, underside brownish, the edges slightly elevated notched spongy pale grey, apothecia black immersed except the powdery blackish-grey apex. *Verrucaria sorediata, Borr. in E. Bot. Suppl. t.* 2612. *f.* 2.

Mud walls at Thetford, Norfolk, *Mr. D. Turner.*

8. E. *pulchéllum*, Borr. (*little filmy-leaved Endocarpon*); scales leaf-like very thin membranous smooth greenish-grey roundish with an elevated incurved edge at length crowded waved cut into rounded lobes and sprinkled with powdery granules, underside pale brown with woolly fibres, apothecia nearly globular black immersed the apex only at length exposed. *Verrucaria pulchella, Borr. in E. Bot. Suppl. t.* 2602. *f.* 1.

"Growing on *Lichen plumbeus* on stems of Heath, on a mountain near Bantry," *Miss Hutchins*, who alone has found it in fructification. The plant itself is of frequent occurrence on mossy trees in Sussex, usually on *Jungermannia dilatata, Mr. Borrer.* — A very curious species and quite unlike any other *Endocarpon:* its thallus has very much the appearance of some small *Thelephora*, to which genus *Acharius*, to whom it was sent, referred the barren frond.

9. E. *læte-vírens*, Turn. (*bright-green Endocarpon*); scales leaf-like thin smooth grass-green irregularly orbicular with shallow rounded lobes, underside white appressed and fibrous in the central part, free elevated and naked at the edges, apothecia — ? *Verrucaria læte-virens, Borr. in E. Bot. Suppl. t.* 2658.—*Endocarpon viride, Ach. Syn. p.* 100.

On mosses in the mountains of Scotland, particularly on *Sphagnum;* also near Esher, Surrey, and Black Down, Sussex, *Mr. Borrer*, who finds it likewise on the wet parts of the sand-rocks in the neighbourhood of Tunbridge Wells. Ireland, *Miss Hutchins* and *Sir T. Gage.* — This has never been found with *apothecia*, and Acharius was disposed to refer the barren *thallus* to his genus *Cenomyce;* but Mr. Borrer justly remarks that in the appressed mode of growth and in the manner in which the scales are attached to the substance on which they are found, it agrees with other species of *Endocarpon* (or leafy *Verrucaria*, Borr.), and he would assign it a place near *V. psoromoides* and *V. pulchella.*

10. E. *smarágdulum*, Ach. (*little Emerald Endocarpon*); thallus of simple depressed cartilaginous peltate roundish smooth greenish-yellow scales, apothecia immersed their points red-brown depressed.— *Ach. Syn. p.* 98. *Schær. Lich. Helv. p.* 62. *n.* 117.—*Lichen smaragdulus, E. Bot. t.* 1512.

On sandstone rocks in Durham, *Rev. Mr. Harriman.* Near Sheean Ferry, Ross-shire, *Borr.* and *Hooker.* Fissures of rocks, Ardtur, Argyleshire, *Capt. Carmichael.*

11. E. *tephroides*, Ach. (*ash-coloured Endocarpon*); thallus crustaceous of depressed areolated and separated lobed or angled

glaucous ash-coloured smooth scales the circumference wavy, tubercles immersed coal-black the apex depressed margined.—*Ach. Syn. p.* 98.—*Lichen tephroides, E. Bot. t.* 2013.

On the ground at Burgh Head in Stronsa, one of the Orkneys, *Borrer* and *Hook.*—In habit, this species seems to be the connecting link between our genera *Endocarpon* and *Verrucaria.* M. Schærar, in his "Observationes Criticæ," refers it to the former.

12. E. *fuscéllum*, (*dark-grey Endocarpon*); crust smooth spreading cracked dark grey somewhat pruinose, apex of the apothecia flat not prominent black.—*Lichen fuscellus, Turn. in Linn. Trans. v.* 7. *p.* 90. *t.* 8. *f.* 2. *E. Bot. t.* 1500.—*E. tephroides, β. polythecium, Ach. Syn. p.* 89.

On the walls of Gorlestone Church, Suffolk, *Mr. Turner*, and in similar situations in other parts of Suffolk and in Norfolk.—Acharius unites this with *E. tephroides*, but I think not justly: the colour, form, and texture are considerably different, and this has still more the habit of a *Verrucaria*, than the last.

13. 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 flattish 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.*

14. E. *sinópicum*, Ach. (*Sinoper Endocarpon*); crust spreading determinate tumid smooth cracked and tessellated scarcely lobed of a rusty red, apothecia minute sunk black depressed in the centre. *Ach. Syn. p.* 98. *Schær. Lich. Helv. p.* 62. *n.* 116.—*Lichen sinopicus, E. Bot. t.* 1776.

On yellow hone schist, Anglesey, *Rev. H. Davis.*—This again, like the last, appears to have as good a claim to rank with *Verrucaria* as with the present Genus. *Mr. Turner* has suggested that *Urceolaria diamarta*, Ach., is probably no other than this plant: but Acharius himself says that in *E. Bot.* the lower magnified figure belongs to that plant, while the upper one is the *E. sinopicum.* The name, according to Sir J. E. Smith, is derived from a red stone, called *Sinoper*, which this Lichen resembles in colour.

Obs.—The *Endocarpon parasiticum*, Ach. (*Lichen parasiticus*, E. Bot. t. 1866.), is now universally considered to be a portion of the thallus of *Parmelia saxatilis* or *omphalodes;* deformed by a parasite.

7. Pertusária. *Ach.* Pertusaria.

Thallus cartilagineo-membranaceous, spreading, adnate, uniform. *Apothecia* verruciform, formed of the *thallus*, one-or many-celled, each cell containing a *nucleus*, opening by a depressed pore.— Named from *pertusus, full of holes;* in allusion to the pores or depressed points in the wart-like excrescences of the thallus.

1. P. *communis*, DC. (*common Pertusaria*); crust greyish-white smooth, warts of the apothecia crowded subglobose with many depressed points. *De Cand. Fl. Fr. ed.* 1. *p.* 330.— *Porina pertusa, Ach. Syn. p.* 109.— *Lichen pertusus, Linn.— E. Bot. t.* 677.— *Schær. Lich. Helv. p.* 64. *n.* 118.

On trunks of trees, abundant.

2. P. *ceuthocárpa*, (*cream-coloured Pertusaria*); crust calcareous continued cream-coloured tessellated unequal smooth, warts of the apothecia tumid globose smooth with black depressed points.— *Lichen ceuthocarpus, E. Bot. t.* 2372.

On slate rocks in Ireland, where it grows in large uninterrupted patches, *Miss Hutchins* and *Sir T. Gage.*— This has a cracked or tessellated *crust*, fewer, more globose warts, and larger dots than *P. communis.*

3. P. *fállax*, Ach. (*doubtful Pertusaria*); crust somewhat spreading plicato-rugose grey, warts of the apothecia crowded irregular depressed above bordered by the swollen almost gibbous and wavy circumference, pores solitary or many large somewhat confluent distorted black. *Porina fallax, Ach. Syn. p.* 110.— *Verrucaria fallax, "Pers."—Pertusaria Wulfenii, De Cand. Thelotrema hymeneum, Ach. Meth.—Lichen hymenius, Ach. Prodr.—E. Bot. t.* 1731.

Not unfrequent on the bark of old Oaks and other trees.— Sir James E. Smith compares the warts of this species, cut perpendicularly, to the grinders of some quadruped. There is, indeed, a peculiarly deformed and distorted appearance about this plant; and it is, along with two other *Pertusaria*, four *Variolariæ*, and two *Isidia*, (as forms of one and the same species), made synonyms to *P communis*, by Sprengel, on the authority of Meyer.— Mr. Borrer considers the present plant to rank with the *Thelotremata*, as is evident from his remarks at the end of the description of his *T. Hutchinsiæ*, *E. Bot. Suppl. t.* 2652.

4. P. *isidioídes*, (*Isidium-like Pertusaria*); "crust thick tartareous frustuloso-areolate yellowish-brown, tubercles small globose pale immersed in tumid roundish warts except the darker slightly prominent apex."— *Verrucaria isidioides, Borr. in E. Bot. Suppl. t.* 2622. *f.* 1.

Rocks, Glangariff, near Bantry, *Miss Hutchins.*— "Acharius would, perhaps, have placed this singular *Lichen* in his genus *Porina:* yet the manner in which their apex usually emerges appears to point out a closer affinity to the other *Verrucaria.* It is, in fact, one of the many links which connect the *Pyrenulæ* of Acharius with his *Endocarpa.*"

5. P. *crássa*, (*thick Pertusaria*); crust cartilaginous undu-

lated olive-brown smooth black-edged, warts of the apothecia very large and irregular with numerous cells and numerous black slightly depressed often confluent and thin linear curved points.—*Opegrapha crassa, DC.—Stigmatidium crassum, Dubis in Bot. Gall. v. 2. p.* 643.—*S. obscurum, Spr.* (*excl. Syn. Pers.*) —*Enterographa crassa, Fée —Lichen obscurus, E. Bot. t.* 1752. (*excluding the Syn.*)—*Porina aggregata, and P. saxicola, Ach. according to Sprengel.*

On the bark of old trees.—This, Sir James E. Smith referred to *Arthonia* of Acharius, and supposed it was the *A. obscura* of that author: while others, Fée and Meyer, have made of it a distinct Genus, the former under the name of *Enterographa*, the latter of *Stigmatidium*, still arranging it with the *Graphideæ*. But the real nature of the fructification is well represented in *E. Bot.*, and Mr. Borrer justly observes that it is only when the tubercles (or, in allusion to the structure of *Pertusaria*, the depressed points of the warts) become confluent, that the plant assumes the appearance of an *Arthonia*.

8. Thelotrêma. *Ach.* Thelotrema.

Thallus crustaceo-cartilaginous, spreading, adnate, uniform. *Apothecium* double, the *outer* consisting of an open *wart* formed of the thallus, the *inner* (one or two) thin, membranaceous, breaking away at the top, its *dish* containing a *nucleus*.—Named from θηλη, a *wart*, and τρημα, a *perforation*; an *open or perforated wart*.—This Acharian Genus is retained by Mr. Borrer, and if it were confined to our first and second species, it would appear to have a structure very unlike that of the other Lichens, and *they* may be considered the type of the Genus. But the other species differ considerably in habit, and assuredly in their fructification also.

1. T. *lepadínum*, Ach. (*wide-mouthed Thelotrema*); crust smooth cream-coloured, warts of the apothecia smooth conoid truncated, inner apothecia (1—2) hollow pale-brown with a thin inflexed edge. *Ach. Syn. p.* 115. *Schær. Lich. Helv. p.* 67. *n.* 121.—*Lichen inclusus, E. Bot. t.* 678.

On the bark of trees, not unfrequent.

2. T. *melaleúcum*, Turn. and Borr. (*small-mouthed Thelotrema*); crustaceous cream-coloured, warts of the apothecia convex opening by an irregular inflexed orifice, inner apothecia depressed brown with a thin obsolete jagged border. *Turn. and Borr. in E. Bot. t.* 2461.

On the smooth bark of young Oaks, Sussex, *Mr. Borrer*; on that of Beech, Argyleshire, *Capt. Carmichael.*—This appears to me to be only a young state of the preceding, and, if I am not mistaken, Capt. Carmichael entertained the same opinion.

3. T.? *exanthemáticum*, Ach. (*eruptive Thelotrema*); crust subtartareous thin continuous ash-coloured, warts of the apothecia hemisphærical with a radiated orifice (their cavity sunk into the stone), inner apothecia concave flesh-coloured depressed

in the centre. *Ach. Syn. p.* 116.—*Thelotrema clausum, Schær. Lich. Helv. p.* 68. *n.* 122.—*Lichen clausus, Hoffm.*—*L. exanthematicus, Sm. in Linn. Trans. v.* 1. *p.* 81. *t.* 4. *f.* 1. *E. Bot. t.* 1184.—*L. volvatus, Vill.*

On exposed calcareous rocks. — Acharius observes that this curious little plant recedes in character from its congeners ; and Mr. Borrer that it has, in its nature, the closest affinity with *Lecidea marmorea, Ach.*

4. T. *Hutchínsiæ*, Borr. (*Miss Hutchins' Thelotrema*) ; crust very white, warts of the apothecia crowded obsolete of irregular figure at length expanding with a broken flocculose inflexed orifice, the nucleus (inner apothecium) forming a dark-grey pruinose concave disk with a white lacerated margin. *Borr. in E. Bot. Suppl. t.* 2652.

On the ground, encrusting fragments of heath, moss, &c., near Bantry, Ireland, *Miss Hutchins.*—" This resembles a good deal the *variety*, as it probably ought still to be accounted, of the Acharian *Urceolaria scruposa*, which in the *Synopsis* is called *Gyalecta bryophila*. Yet in the structure of the fructification, it appears to agree essentially with the type of the Genus *Thelotrema*, (*T. lepadinum*,) particularly in the presence, in an advanced stage, of a thin margin to the discoid *nucleus*, separate from the spurious one, formed from the substance of the *thallus*."

(True Lichens.)

c. *Apothecia? naked sporules* (*gongyli or pulvinuli*).

Fam. V. Coniocarpeæ.

9. Leprária. *Ach.* (Lepra, *Hall.*) Lepraria.

Thallus crustaceo-leprous, spreading, adnate, uniform. *Apothecia* none. *Sporules* naked, forming the *thallus*, scattered, and conglomerated, free.—Named from λεπρα, *leprosy ;* from the scurfy appearance of the species.—This genus is assuredly among the most simple of what are called *True Lichens* by M. Fée. Though the infant granules may sometimes form an imperfect apparent crust distinct from the sporules ; yet, in general, this plant consists of an uniform stratum, more or less thick, of minute granules, which some have considered merely as the thallus of a plant of which the fructifications are unknown, others as a mass of *sporules*, *gongyli* or *pulvinuli* of some authors, *propagula* of *Messrs. Turner and Borrer*. These last-mentioned Botanists have, fortunately for science, written their History of this Genus, and I gladly adopt their arrangement and characters, only removing those species (*L. æruginosa* and *L. chlorina*) which have filaments mixed with the granules, to the *Fungi*. Dubis and De Candolle remark on *Lepraria*, " Genus vix hujus familiæ et ex elementis heterogeneis (Lichenum crusta sterili, Fungorum, Algarum prima evolutione) probabiliter conflatum." Hence the *L. æruginosa* has been referred to the *Al-*

gæ by Nees and Sprengel, while Dr. Greville's *Chlorococcum* (a genus of *Algæ*) *vulgare* which he has most judiciously separated from the *Palmella botryoides*, with which it had been confounded, is the *Lepraria viridis* of Messrs. Turner and Borrer. But it appears to have an equal claim to rank with the other *Leprariæ* among the *Lichens*, as with the *Algæ*. No distinct fructification has been found, and the character of the Genus *Chlorococcum* is in reality the same as that of *Lepraria*, "*Granula omnino libera minima aggregata absque gelatina.*" If therefore *L. viridis* be removed to the *Algæ*, so should the rest of the *Leprariæ*.

1. L. *víridis*, Turn. and Borr. (*common green Lepraria*); crust none, sporules extremely minute bright green globular collected into a continuous thin crustaceous powdery mass. *Turn. and Borr. Lich. Br. p.* 6.—*L. botryoides*, (*excl. the syn. of Linn. and Dill.*). *Ach. Syn. p.* 331. ?—*Lichen viridis, Schreb. Spicil. p.* 139.—*Chlorococcum vulgare, Grev. Scot. Cr. Fl. t.* 262.

On pales, old buildings, trees and walls, abundant.—The granules are often clustered together, and *Dr. Greville* observes them to be so in fours.—The membranous base to this species, noticed by Sir J. E. Smith, has not been remarked by other Botanists.

2. L. *murórum*, Grev. (*wall Lepraria*); sporules green simple minute oval-oblong.—*Chlorococcum murorum, Grev. Scot. Cr. Fl. t.* 325.

On walls and stones, frequent, *Dr. Greville.*—This forms small spots of a yellowish-green colour, the spots at length becoming confluent. It is so closely allied to the preceding, that whether that be placed with the Algæ or with the Lichens, the present should rank next to it.

3. L. *ochrácea*, Turn. and Borr. (*ochry Lepraria*); crust none, sporules extremely minute ochraceous-yellow collected into thin scattered patches. *Turn. and Borr. Lich. Br. p.* 8. *E. Bot. t.* 2408.

Trunks of old trees, at Hurst-pierpoint and Poynings, Sussex. Trees about Yarmouth and Halesworth, generally upon *Hypnum sericeum.*

4. L. *fláva*, Ach. (*bright-yellow Lepraria*); crust none, sporules extremely minute bright yellow collected into a continuous crustaceous powdery mass. *Ach. Syn. p.* 331. *E. Bot. t.* 1350. *Turn. and Borr. Lich. Br. p.* 9.—*Lichen flavus, Schreb.*—*Byssus candelaris, Linn.*

Frequent on the rugged trunks of Oaks, on boarded buildings and pales, rarely on walls.

5. L. *álba*, Ach. (*white Lepraria*); crust grey edged with white downy fibres, sporules extremely minute snowy-white densely collected into continuous crustaceous patches. *Ach. Meth. p.* 3. *E. Bot. t.* 1349. *Turn. and Borr. Lich. Br. p.* 15. —*Lecidea alba, Ach. Syn. p.* 24. ?—*Byssus lactea, Linn.* ?

Trunks of trees and boarded buildings, common: sometimes, but rarely on walls.

6. L. *viréscens*, Sm. (*dull-green Lepraria*); crust filmy greyish, sporules rather large subgelatinous deep green greyish when dry collected into a thickish crustaceous mass. *Turn. and Borr. Lich. Br. p.* 17. *E. Bot. t.* 2149.

Trunks of old trees, principally Elm, in Sussex, Surrey, Suffolk and Norfolk; generally near the ground.

7. L. *cinereo-sulphúrea*, Ach. (*yellow-grey Lepraria*); very thin submembranaceous whitish the surface scattered over with very minute aggregated granules greenish-yellow at first afterwards cinereous. *Ach. Syn. p.* 330. *Grev. Fl. Edin. p.* 352.

On the trunks of Scotch Firs, near Edinburgh, *Dr. Greville.*

8. L. *Jólithus*, Ach.? (*violet-scented Lepraria*); crust filmy greyish, sporules extremely minute very red collected into a thin even powdery mass. *Turn. and Borr. Lich. Br. p.* 19. *E. Bot. t.* 2471.—*L. rubens*, *Ach. Syn. p.* 331.—*Byssus Jolithus*, *Linn. Sp. Pl. p.* 1638.?

On boarded buildings, old pales, and trunks of trees; on rocks in mountainous countries, sometimes on walls.—This plant is no less remarkable for its colour, than for the violet odour which it yields on being rubbed, and which remains with the plant long after it has been dried.—Under *Byssus Jolithus*, two plants have been described, one filamentous, the other pulverulent. The latter is our *Lepraria;* the former is the *Chroolepus Jolithus* of *Ag. Syst. Alg. p.* 34.; nearly allied to the *Chr. lichenicola* of the same author, *Conferva lichenicola*, *E. Bot. t.* 1609.

9. L. *nígra*, Turn. and Borr. (*black Lepraria*); crust filmy greyish, sporules extremely minute black collected into a continuous thin even powdery mass. *Turn. and Borr. Lich. Br. p.* 21. *E. Bot. t.* 2409.

On squared timber. It forms large ink-like stains on the square tops of posts and other timber.

10. Spilóma. *Ach.* Spiloma.

Thallus crustaceous, spreading, adnate, uniform. *Apothecia* none. *Sporules* naked, coloured, collected into compact tumid masses.—Name; σπιλωμα, *scattered spots;* from the appearance of the fructifications.—"The transition" say Messrs. Turner and Borrer (to whom we are indebted for all that is most valuable respecting this Genus) "from the *Lepraria* to the *Spilomata*, is easy and simple; a single step, and that a short one, seems sufficient to lead us from the *propagula* (*sporules*) of the former, scattered indiscriminately and constituting altogether what appears to be a barren *crust*, to those of the latter, collected indeed here and there into little clusters, called *pulvinuli*, but, at the same time, destitute of any integument or even margin, and wholly simple in their construction; except that in some species may be discerned, by accurate observation, a small fleshy *disk;* which probably would be found to exist equally in all, did not

the extreme minuteness of the parts prevent its being detected; and which, in one individual (*S. gregarium*) actually rises above the surface of the *thallus*, and is often found quite bare, forming what appears a very conspicuous *apothecium*."

1. S. *microscópicum*, Turn. and Borr. (*microscopic Spiloma*); crust spreading widely filmy very thin greyish, apothecia extremely minute black lead-coloured when dry. *Turn. and Borr. Lich. Br. p.* 30. *E. Bot. t.* 2396.

Common on boarded buildings, &c. — "*Thallus* or *crust* a most obscure grey film, spreading indeterminately and very widely, so thin as merely to tinge the fibres of the wood on which it grows. *Apothecia*, (or *pulvinuli*, as they are called by Messrs. Turner and Borrer,) not discernible, except with a microscope of considerable power. *Sporules* bluish when dry, black when wet, readily adhering to the fingers."

2. S. *murále*, Turn. and Borr. (*wall Spiloma*); crust none? apothecia extremely minute confluent black. *Turn. and Borr. Lich. Br. p.* 31. *E. Bot. t.* 2397.

On plastered walls of cottages, in the parishes of Hurst-pierpoint and Albourne, Sussex; and on the walls of Burgh Church, Suffolk. — The absence of *thallus* is accounted for by the authors of *Lichenographia Br.* by the circumstance of this plant having as yet been detected only on mortar and coarse-grained stone, on which substances the *thallus* of other *Lichens* is known to grow very thin and sometimes altogether to disappear.

3. S. *sphærále*, Ach. (*globose parasitic Spiloma*); parasitic, apothecia minute subglobose scabrous black opaque. *Ach. Syn. p.* 2.

Upon the *crust* and *podetia* of *Isidium corallinum* and other *Lichens*. — This is enumerated in Mr. Borrer's list of the British species; but I am unacquainted with it.

4. *S. dispérsum*, Turn. and Borr. (*dispersed Spiloma*); crust filmy very thin greyish, apothecia mostly dispersed hemisphærical sooty-black internally of a yellowish-green. *Turn. and Borr. Lich. Br. p.* 32. *E. Bot. t.* 2398.

On old rails, not unfrequent. — This agrees with *S. microscopicum* in its obscure filmy *thallus*, but differs abundantly in the size, disposition and structure of the *apothecia*. "It is not unfrequently found intermixed with it; insomuch that we would by no means be understood as speaking with certainty, when we mention its *thallus*, whether this *thallus* may not, in reality, belong to the other, and *S. dispersum* be altogether destitute of one."

5. S. *aurátum*, Sm. (*golden Spiloma*); crust inclining to tartareous thin white, apothecia rather convex at length confluent deep brown internally yellow. *E. Bot. t.* 2078. *Turn. and Borr. Lich. Br. p.* 33. — *S. tricolor, Ach. Syn. p.* 2.

Common on timber, in old walls, &c., Sussex; on Elm-bark at Portslade: on the church-walls at Henfield, Sussex, and Wrentham, Suffolk; and very fine on churches near Bury St. Edmunds. — Of this very curious and beautiful species, the *apothecia* are "about the size of poppy-seed, round, more or less convex, soon becoming confluent and

frequently almost covering the *thallus*. *Sporules* so minute that the highest powers of the microscope are insufficient to discover their figure; those of the surface, which are deep brown with a fuliginous tinge, rub off with the slightest touch and discover the dull but full yellow (or orange-) colour of those which compose the internal part of the apothecium."—In *E. Bot.*, *S. auratum* is described and figured with a crust, not belonging to it; for it often spreads over the thick tartareous *thalli* of *Verrucaria* and *Opegrapha*, &c.

6. S. *nígrum*, Turn. and Borr. (*black Spiloma*); crust inclining to tartareous thin white with a narrow black edge, apothecia roundish nearly flat at length confluent black. *Turn. and Borr. Lich. Br. p.* 35. — *α. variolosum;* crust powdery pure white, apothecia convex but little confluent black. *Coniocarpum nigrum*, *De Cand. Fl. Fr. ed.* 2. v. 2. *p.* 324. *Dubis and De Cand. Bot. Gall. v.* 2. *p.* 695. — *Spiloma variolosum*, *E. Bot. t.* 2077. — *S. melaleucum*, *Ach. Syn. p.* 2.—*β. versicolor;* crust inclining to powdery grey variegated with greenish-yellow, apothecia flat very confluent. *S. versicolor*, *Ach. in Web. et Mohr Arch. p.* 108. *E. Bot. t.* 2076. — *γ. erubescens;* crust tartareous reddish cracked into areolæ, apothecia small shapeless for the most part distinct.

Not unfrequent on old trees, chiefly Oaks; sometimes on bare wood in sheltered places. Old Church-walls in Suffolk, *Sir T. Gage*, *Bart.*—*β.* On smooth bark, as on Hornbeam, in Norfolk and Suffolk, and on Walnut at Albourne, Sussex.—*γ.* on smooth trees in Norfolk and Suffolk, and at Henfield and Albourne, Sussex.

7. S. *fuliginósum*, Turn. and Borr. (*sooty-fruited Spiloma*); crust inclining to tartareous but still very thin nearly white with a fuliginous edge composed of downy fibres, apothecia very minute punctiform confluent sooty-black. *Turn. and Borr. Lich. Br. p.* 37.—*S. microclonium*, *E. Bot. t.* 2150. (*not Ach.*).

On the rugged trunks of old trees. In Windsor Forest, *Mr. Sowerby.* Near Esher, Surrey; Belton and Blundeston, Suffolk.—Allied to *S. nigrum*, from which it is distinguished by the colour, size and indistinct figure of its innumerable *apothecia*, which are so uninterruptedly scattered over the *thallus* as to render the plant liable to be mistaken for a *Lepraria*.

8. S. *decólorans*, Turn and Borr. (*staining Spiloma*); crust spreading widely very thin and for the most part filmy, apothecia flat inconspicuous confluent of a purplish grey. *Turn. and Borr. Lich. Br. p.* 39. *E. Bot. t.* 2399.

Common on old walls, boarded buildings and pales.—This is, in habit, allied to some *Variolariæ;* but as the fructifications appear to be *pulvinuli* rather than *soredia*, the plant is arranged here.

9. S. *punctátum*, Turn. and Borr. (*dotted Spiloma*); crust filmy somewhat powdery thin white, apothecia scattered minute punctiform solid, sporules blackish-brown superficial. *Turn. and Borr. Lich. Br. p.* 40. *E. Bot. t.* 2472.

On old oaks at Coltishall, Norfolk.—Of doubtful genus, in some respects allied to *Arthonia*, in others to *S. gregarium*.

10. S. *gregárium*, Turn. and Borr. (*red clustered Spiloma*); crust filmy thin greyish, apothecia clustered shapeless solid of a livid hue, sporules vermillion-coloured superficial. *Turn. and Borr. Lich. Br. p.* 42. — *α. cinnabarinum;* apothecia somewhat convex covered with a profusion of vermillion-coloured sporules. *Coniocarpum cinnabarinum, De Cand.* — *Spheria gregaria,* "*Weigel.* 43. *t.* 2. *f.* 10." *Dicks. Cr. Fasc. t.* 22. *Sower. Br. Fung. t.* 375. *f.* 5.—*Spiloma tumidulum, Ach. Syn. p.* 1. *E. Bot. t.* 2151. — *Lichen impolitus, E. Bot. t.* 981. — *β. rosaceum;* apothecia collected into flat clusters which have the appearance of being lobed, sporules copious vermillion-coloured. — *γ. marginatum;* apothecia somewhat convex party-coloured, sporules few chiefly confined to the margin.—*δ. concolor;* apothecia convex of nearly the same colour as the crust, sporules scarcely any. — *ε. dubium;* apothecia rather convex lurid pruinose, sporules none. — *ζ. detritum;* apothecia depressed lurid nearly naked, sporules none. — *η. microstigma;* apothecia minute solitary depressed covered with a whitish pruina, sporules none.

α. and *γ.* are common on bark, chiefly on smooth trees. — *β.* on old Oak on Poynings Common, Sussex. — *δ.* and *ε.* grow on Oak and Ash. — *ζ.* chiefly on Hazel. — *η.* on Ash in shady places. — "The large size of the *compact base* or internal disk of the *pulvinuli*, sufficiently distinguishes the present plant, through all its variations, from its congeners; as in every other *Spiloma*, hitherto detected, *S. punctatum* alone excepted, this part, if present at all, is very minute and entirely concealed by the *sporules*." The two last varieties *ε.* and *ζ.* bear a close resemblance to *Arthonia impolita;* but the *thallus* of the *Arthonia* is stated to be always thicker and more uneven, and its *apothecia*, though larger, are generally less conspicuous than those of the *Spiloma*, being scarcely, if at all, elevated above the level of the *thallus:* their internal substance likewise is very different, presenting a more waxy appearance when cut.

11. S.? *tuberculósum*, Sm. (*warty Spiloma*); crust calcareous greyish-white, apothecia scattered somewhat confluent unequal elevated granulated black. *E. Bot. t.* 2556. *Schær. Lich. Helv. p.* 2. *n.* 5.

On sandstone rocks, in the neighbourhood of Newcastle. — Mr. Borrer considers the *thallus* to be probably that of some *Lecidea*.

Obs. — The *Spiloma melanopum* of *Sm.* in E. Bot. t. 2358., described as having "the crust very thin greyish, apothecia flat dilated irregular somewhat confluent black," and communicated by Mr. Borrer to Sir Jas. E. Smith, is now considered to be a doubtful production, being mixed with comparatively large jointed filaments, probably belonging to some *Conferva* or filamentous *Fungus*. The *Spiloma melanopum* of *Ach. Meth. p.* 10. *t.* 1. *f.* 3., to which it is referred, seems to be something very different, as far as can be judged from the description and figure, and is indeed now, by Acharius himself, stated to be formed of his *Arthonia melanthera*, upon a stratum of his *Lepraria atra*, Lich. Univ. (*Lecidea melanopa*, of the *Syn.*)

d. *Apothecia opening into depressed or hollow shields or pustules (variolæ).*

Fam. VI. Variolarieæ.

11. Variolária. *Pers.* Variolaria.

Thallus crustaceous, membranaceous, adnate, spreading, uniform. *Apothecium* a suborbicular, scutelliform cup, formed of the thallus, filled with a powdery or flocculose substance, which covers an immersed waxy *disk* containing imbedded *thecæ.* — Name, *variolæ;* from the apothecia resembling the pustules of the measles or small-pox.—" The Genus appears a natural one, but bordering upon many others. By *S. Vitiligo* it is connected with *Spiloma;* by *V. multipunctata* with *Thelotrema,* (or rather perhaps *Pertusaria*); by *V. argena* (still more by *V. velata*) with *Parmelia* (*Lecanora,* Ach. Syn.); and by *V. agelæa* with *Urceolaria;* while by *Isidium paradoxum* there is a close affinity with that genus." *Turn. and Borr.*; whose arrangement and character are here followed. — In *V. velata* the place of the *powder* or *soredia* in the *apothecia* is occupied by a thin membranous veil drawn over the disk.

1. V. *Vitilígo,* Turn. and Borr. (*leprous Variolaria*); crust elliptical almost filmy very thin smooth whitish indeterminate, apothecia very numerous minute oblong confluent with a very narrow elevated margin, powder lead-coloured. *Turn. and Borr. Lich. Br. p.* 53. — *Spiloma Vitiligo, Ach. Meth. p.* 10. *t.* 1. *f.* 4. *E. Bot. t.* 2073. *Lecanora apochræa, Ach. Syn. p.* 162.
Common on old rails and gate-posts.

2. V. *griseo-vírens,* Turn. and Borr. (*greyish-green Variolaria*); crust elliptical inclining to tartareous thin slightly rugged grey nearly indeterminate, apothecia small nearly orbicular with a very narrow elevated border, powder greenish-grey. *Turn. and Borr. Lich. Br. p.* 54. *E. Bot. t.* 2400.
Birch-trees on Stratton-Strawless Heath, Norfolk, *Mr. D. Turner.* On Cherry bark at Killarney, *Sir T. Gage.*

3. V. *conspurcáta,* Turn. and Borr. (*dusty Variolaria*); thallus suborbicular tartareous thick whitish surrounded when young by a zonate border of various colours, apothecia minute inconspicuous with a depressed evanescent border, powder grey. *Turn. and Borr. Lich. Br. p.* 57. — *Lichen conspurcatus, E. Bot. t.* 964. (*with black parasitical bodies represented in the magnified figure.*) — *Lecidea? conspurcata, Ach. Meth. p.* 50.— *L. margaritacea, β. Ach. Lich. Un. p.* 187. — *β. lateritia;* crust very thin copiously sprinkled with lead-coloured apothecia. *Turn. and Borr. l. c.*—*γ. albella;* crust continuous but slightly rugose, both it and the apothecia white. *Turn. and Borr. l. c.*

On calcareous stones, in the walls of old churches, &c., frequent; sometimes on plastered walls. β. on brick walls. γ. on limestone rocks, Killarney, *Sir T. Gage.*

4. V. *globulífera*, Turn. (*globuliferous Variolaria*); crust orbicular somewhat tartareous thickish glaucescent rugose sprinkled all over with white soredia and surrounded by a somewhat zonate border of various colours, apothecia large spherical depressed at the apex where they at length burst irregularly becoming scutelliform with a lacerated border, powder white. *Turn. in Linn. Trans. v.* 9. *p.* 139. *t.* 10. *f.* 2. *Turn. and Borr. Lich. Br. p.* 60. *Ach. Syn. p.* 130. — *V. glomulifera, Ach. Lich. Univ. p.* 322. *t.* 5. *f.* 9. — *Lichen globuliferus, E. Bot. t.* 2003.

On old Oaks at Hurst-pierpoint, and on Beech-trees in the Sussex Forests, *Mr. Borrer.*

5. V. *discoidéa*, Pers. (*insipid zoned Variolaria*); crust orbicular somewhat tartareous thickish glaucous-white surrounded by a zonate border of various colours, apothecia numerous flat with a thick border, powder snowy-white. *Turn. and Borr. Lich. Br. p.* 61. — *V. amara*, c. *discoidea, Ach. Syn. p.* 132. — *Lichen discoideus, Ach. Prodr.*? *E. Bot. t.* 1714. — *Dill. Musc. p.* 18. *f.* 11. *D.*

Common on the bark of trees, and, occasionally, on pales, walls, and rocks.

6. V. *fagínea*, Pers. (*bitter zoned Variolaria*); crust orbicular somewhat tartareous thickish glaucus-white surrounded by a zonate border of various colours, apothecia very abundant convex with an obsolete border, powder snowy-white. *Turn. and Borr. Lich. Br. p.* 64. — *V. communis*, b. *faginea*? *Ach. Syn. p.* 130. — *Lichen fagineus, Linn.* — *E. Bot. t.* 1713.

Common on the bark of trees, especially of old Beech, and on pales. — "The intensely bitter taste of this *Lichen* distinguishes it from every species hitherto discovered. It is upon this circumstance, which we have never found to vary, that we have been induced to place our chief reliance in making *V. faginea* and *V. discoidea*, distinct; for it must not be dissembled that they are two plants which nearly agree in almost every other particular; and which have been confounded by the great majority of authors." *Turn. and Borr.* — M. Braconnot detected in this and several other crustaceous Lichens, *oxalic acid;* in the present plant in such abundance that 100 parts yielded 18 of lime, combined with 29.4 of oxalic acid; and nearly the same quantity in several other crustaceous Lichens. And he remarks that the oxalate of lime bears the same relation to the *Cryptogamia* as carbonate of lime to corals, and phosphate of lime to the bony structure of the more perfect animals. It diminishes, however, gradually in the family of *Lichens*, in proportion as the species lose their general crustaceous texture and approach more and more to the membranous or cartilaginous, although the latter also contain a considerable quantity of salt.[1] M. Braconnot strongly recommended the adoption of *V. faginea* in the production of oxalic acid, and

[1] Edin. N. Phil. Journ. v. 13. p. 193.

an eminent French Chemist now informs me that it is so employed in France, and upon a very extensive scale.

7. V. *aspergílla*, Ach. Lich. Univ. (*sprinkled Variolaria*); crust orbicular somewhat tartareous thickish dull-white wrinkled surrounded by a smooth polished somewhat zonate border of one colour, apothecia scattered elevated hemisphærical with scarcely any border, powder very white. *Turn. and Borr. Lich. Br. p.* 67. *E. Bot. t.* 2401.— *V. communis*, g. *aspergilla*, *Ach. Syn.*

On Oak and Beech, park-pales, and on rocks.

8. V. *láctea*, Pers. (*milky-white Variolaria*); crust suborbicular tartareous thick white smooth areolate tinged at the edges with flesh-colour, apothecia copious suborbicular flattish with an elevated border when young which afterwards disappears, powder very white. *Ach. Syn. p.* 132. *Turn. and Borr. Lich. Br. p.* 69. *E. Bot. t.* 2410.—*Lichen lacteus, Linn. Mant.*—*β. arenaria;* crust continuous dirty lead-colour, apothecia elevated nearly sphærical. *Turn. and Borr. l. c.*

Rocks, in mountainous countries. *β.* sandstone rocks, Sussex, *Mr. Borrer.* Ireland, *Mr. J. T. Mackay.*

9. V. *cenérea*, Sm. (*ash-coloured Variolaria*); crust orbicular tartareous thin ash-coloured cracked its circumference indeterminate, apothecia orbicular very small white with an elevated margin and a flesh-coloured disk. *E. Bot. t.* 2411.

On whinstone, in Durham, *Rev. Mr. Harriman.*— Sir Jas. E. Smith remarks upon this (with which I am unacquainted): "It has been considered a variety of *V. lactea*, but we presume to think it as distinct as any other of the genus, differing from *V. lactea* in the grey ashy colour and greater tenuity of the *crust*, but especially in the margin being indeterminate."

10. V. *multipunctáta*, Turn. (*many-dotted Variolaria*); crust orbicular between filmy and tartareous thin rugulose glaucous-white surrounded by an even polished very thin white border, apothecia abundant hemisphærical compound dotted with an inflexed border, powder white not copious. *Turn. in Linn. Trans. v.* 9. *p.* 137. *t.* 10. *f.* 1. *Ach. Syn. p.* 129. *Turn. and Borr. Lich. Br. p.* 73.—*Lichen multipunctatus, E Bot. t.* 2061.—*β. lævigata;* crust cream-coloured scarcely cracked or rugose, apothecia depressed. *Turn. and Borr. l. c.*

Beech-trees in Sussex, common, *Mr. Borrer.* New Forest, *Mr. Lyell.* Durham, *Mr. Robson* and *Mr. Thornhill.*—*β.* St. Leonard's Forest, on Beech and Oak, *Mr. Borrer.*

11. V. *veláta*, Ach. (*veiled Variolaria*); crust limited membranaceo-verrucose wrinkled greyish with a pale edge, apothecia small crowded, the disk yellowish veiled with a white membrane, border thick even of the substance of the crust, powder none. *Ach. Syn. p.* 119.—*Parmelia velata, Turn. in Linn. Trans. v.* 9. *p.* 143. *t.* 12. *f.* 1.— *Lichen velatus, E. Bot. t.* 2062.

In this instance, only, so far as regards the present genus, do I differ from the learned authors of the *Lichenographia Britannica*, by considering this plant rather as a *Variolaria* than a *Parmelia* (*Lecanora*, *Ach.*). Its crust and general habit, as Sir James E. Smith observes, are those of *Variolaria multipunctata*, where the powder of the shields is very deficient, and where the *disk* (*lamina proligera*) is very evident. Here the *disk* is still more copious, the powder is entirely absent, and its place is supplied, if I may use the term, by a white membrane, stretched across the whole *apothecium*. If, however, it be placed among the *Lecanoræ* it must rank with *L. Parella*.

12. V. *argéna*, Turn. and Borr. (*silvery Variolaria*); crust suborbicular between filmy and tartareous very thin rugulose grey covered here and there in patches with white powder surrounded by a white fibrous border, apothecia in scattered clusters orbicular flattish with an inflexed border, powder white not abundant. *Turn. and Borr. Lich. Br. p.* 75.—*Lichen argæus, and L. agelæus, (according to Ach.) Ach. Prodr. p.* 8. *E. Bot. t.* 1923. (*bad*).—*Lecidea argœna, Ach. Meth. (not Syn.)*—*Thelotrema variolarioides, β. Ach.*—*Lichen farinosus, Hoffm.*—*Lecanora verrucosa, Ach. Lich. Univ. p.* 354.—γ. *Ach. Lich. Univ. p.* 355.

On the bark of Lime and other trees, not uncommon.

13. V. *agelæa*, Turn. and Borr. (*inelegant Variolaria*); crust elliptical almost filmy whitish surrounded by an obsolete border of the same colour, apothecia very numerous depressed shapeless crowded and becoming confluent so as to appear compound with an inflexed border, powder white, the disk at length bare blackish. *Turn. and Borr. Lich. Br. p.* 78.—*Lichen agelæus, Ach. Meth.*—*E. Bot. t.* 1730.—*Thelotrema variolarioides, β. agelæa, Ach. Syn. p.* 117.—*Urceolaria agelæa, Ach. Meth.*—*Lecanora verrucosa, β. Ach. Lich. Univ. p.* 355.

It will be seen by the synonyms of this and the preceding Lichen what different opinions have been held, even by Acharius himself, respecting their generic and specific identity. At length, in his *Synopsis*, he has referred both of them to one and the same *variety* of *Thelotrema variolarioides*. *V. agelæa* is ranked by Messrs. Turner and Borrer among the *Variolariæ*, on account of the presence of the powder in the young and vigorous state of the plant; but they still call it an "obscure Lichen." They observe that it differs from *V. argena* and *V. multipunctata*, in the thinner and more even *thallus*, and in the shape and structure, as well as in the greater number, of its *apothecia*.—Some of the figures in *E. Bot.* appear to me to bear a great resemblance to *Pertusaria communis*.

e. *Apothecia bordered, discoid, sessile (patellulæ).*

Fam. VII. Lecanoreæ.

12. Urceolária. *Ach.* Urceolaria.

Thallus crustaceous, spreading, adnate, uniform. *Apothecia* (*patellulæ*) orbicular, the *disk* concave, coloured, immersed in the crust, the *border* formed of the crust and of the same colour.

— Name, *urceolus*, a *little pitcher;* from the hollowed form of the *apothecia*, which, taken in conjunction with the elevated border formed of the crust itself, constitutes the essential character of this genus.

1. U. *scrupósa*, Ach. (*common Urceolaria*); crust greyish-white rugose granulated, apothecia with the disk deeply immersed concave black the border very thick incurved crenated. *Ach. Syn. p.* 143. *Schær. Lich. Helv. p.* 75. *n.* 132.—*Lichen scruposus, Dicks.*—*E. Bot. t.* 266.—*Gyalecta bryophila, Ach. Syn. p.* 10.—*Dill. Musc. t.* 18. *f.* 15. *B.*

On heaths, walls and rocks.

2. U. *gibbósa*, Ach. (*gibbous-fruited Urceolaria*); crust smoky-brown formed of minute tessellated warts with a radiated marginal fringe, apothecia immersed in each wart concave blackish with an undivided elevated pale border. *Sm.*—*Ach. Syn. p.* 139.—*U. fimbriata, Ach. Meth.*—*Lichen fibrosus, E. Bot. t.* 1739.

On flints upon the South-downs, Sussex, *Mr. Borrer.* Common on flinty pebbles, *Mr. Sowerby.*— Mr. Schærar refers this plant of E. Bot. and the *U. fimbriata*, Ach. without any doubt to *U. scruposa.*

3. U. *calcárea*, Ach. (*calcareous Urceolaria*); crust indeterminate greenish ash-coloured cracked and tessellated, apothecia immersed in the raised centre of the areolæ nearly flat brownish with an undivided elevated pale powdery border. *Sm.*—*Ach. Syn. p.* 143, (*var.* β.).—*Lichen Hoffmanni, E. Bot. t.* 1940.—*Urceolaria Hoffmanni, Ach. Meth.*—*Lichen cinereus, E. Bot. t.* 820. (*L. multipunctatus, under t.* 1751.), *excl. the Syn.*

On rocks, stones and walls, in many places.—The *L. cinereus, E. Bot. t.* 820., can surely not be distinguished from the *U. calcarea.* Smith afterwards referred it to the *Verrucaria multipunctata*, Hoffm.: but *that* Acharius adduces as a synonym to *Lecidea albo-cærulescens.* Indeed it may be said of this, and the following *Urceolariæ*, that they have an equally strong claim to rank with *Lecidea;* or, if a slightly raised border of the crust be considered to belong to the *apothecia*, to *Lecanora.* In all, the *apothecia* are nearly level with the crust.

4. U. *cinérea*, Ach. (*grey Urceolaria*); crust grey rugged and cracked with a broad greenish undulated border, apothecia immersed solitary or clustered slightly concave black with an elevated entire border of the substance of the crust. *Sm.*—*Ach. Syn. p.* 240. *Schær. Lich. Helv. p.* 70. *n.* 125—129.—*Lichen cinereus, E. Bot. t.* 1751.

Abundant on loose exposed flints, in Sussex, *Mr. Borrer.*— I scarcely, myself, see how this is distinguishable from *U. calcarea:* though Sir J. E. Smith says it is nearly allied to *U. gibbosa.*

5. U. *Achárii*, Ach. (*Acharian Urceolaria*); crust somewhat determinate smooth a little cracked pale brick-colour, apothecia sunk in the crust reddish, the border tumid.—*Ach. Syn. p.* 137.—*Lichen Acharii, Wahl. Lapp. p.* 405. *E. Bot. t.* 1087.— β. *cyrtaspis*, rugged greyish-white with a very narrow black edge,

apothecia minute very numerous roundish black (often brown-red) with a white border incorporated with the crust. *Sm.* —*Ach. Syn. p.* 137.—*Lecanora cyrtaspis, Ach. Lich. Univ.*—*Lichen punctatus, Dicks.*—*E. Bot. t.* 450.

On rocks and stones, frequent.—The colour of the *var. α.* of this *Lichen*, on which it chiefly depends for its character, seems to me to be owing to the oxide of iron, which tinges other species growing on the same stones. I follow Acharius in making the *V. punctat.* a *var.* of it: but if either be really distinct from *V. cinerea* or *calcarea*, I should prefer considering the *var. β.* the type of the species.

6. U. *ruféscens, (reddish Urceolaria)*; crust indeterminate thin tartareous tessellated brown, apothecia small dark-chestnut immersed at length flat with an elevated entire margin. *Borr.* —*Sagedia rufescens, Ach. Syn. p.* 135.—*Lecidea rufescens, Borr. in E. Bot. Suppl. t.* 2657.

Rare. On sandstone (walls?) at Gorlestone, Suffolk, *Mr. D. Turner.* —Mr. Borrer remarks that this approaches in structure the *Lecidea cechumena, β. athroocarpa*, which indeed corresponds in its sunken shields with some Acharian *Urceolariæ*. "We do not understand satisfactorily," says Mr. Borrer, "the distinction between the Acharian genera *Urceolaria* and *Sagedia*, and since every gradation is to be found, among the crustaceous Lichens, between completely immersed and completely protuberant *apothecia*, it is perhaps best to refer, for the present, to *Lecidea*, all those species in which the apothecium has a proper margin, whether it be, or be not, surrounded by an accessory margin from the thallus."

Obs.—Mr. Borrer, in a list of species of certain British genera of *Lichens* which he has been so good as to communicate to me, enumerates 4 of the Acharian Genus *Gyalecta;* but none is figured in *E. Bot.*, and Acharius alone seems to be the authority for two (*G. epulotica* and *G. æthalea*). I am myself unacquainted with them: and the observations of Mr. Borrer will, I think, justify me in not introducing them into our British list. Of the 4 species, he says: "1. *G. epulotica, Ach. Syn. p.* 9. I am so imperfectly acquainted with this as not to know how it differs from *Urceolaria Acharii*, notwithstanding Acharius' '*toto cælo ab hac distincta.*' 2. *G. bryophila, Ach. Syn. p.* 9. I still regard this as a state of *U. scruposa*, (under which plant it is quoted). 3. *G. Wahlenbergiana, β. Ach. Syn. p.* 9. We have on Elms in Sussex what I suppose to be this, but I am doubtful whether it be not a *var.* of *Lecidea marmorea.* 4. *G. æthalea, Ach. Syn. p.* 10. Unknown to me."—This last is stated by Acharius to be found at Durham, by the *Rev. Mr. Harriman:* it is thus characterized in the Synopsis: "crusta determinata nigro-limitata cinereo-fumosa tenuissime rimosa, apotheciis minutis nigris demum planiusculis." If I understand the Acharian genus *Gyalecta* correctly, it is distinguished from *Urceolaria* by the absence of the *border* formed by the crust to the *apothecia*. Mr. Schærar refers to it the *Lecidea marmorea*, Ach.: but Acharius' character would scarcely admit it.

13. Lecidéa. *Ach.* Lecidea.

Thallus crustaceous, spreading, adnate, uniform. *Apothecia* (*patellulæ*) orbicular, sessile, plano-convex, having a *border* of

the same colour as the *disk.*—Name; λεχις, a *small shield*, and ειδος, *form;* from the small shield-like appearance of the *apothecia.*—From the Acharian *Lecideæ* those species are here separated which have a distinctly scaly or imbricated *thallus:* as the genus stands here, it differs then from the following one solely in the nature of the *apothecia.*—The arrangement of the species is that of Mr. Borrer.

* *Apothecia always black.*

1. L. *atráta*, Wahl.? (*inky-crusted Lecidea*); crust continuous even minutely tessellated of a greyish rather opaque black its fragments angular slightly concave, apothecia in the interstices half-sunk flattish coal-black with an elevated entire black border. *Ach. Syn. p.* 11.—*Lichen atratus, E. Bot. t.* 2335.—*Lecidea coracina, Ach. Syn. p.* 11.

Granite rocks in Glen Esk, Angus-shire.—Mr. Borrer says that the *Lichen atratus* of E. Bot., though named independently, is perhaps Wahlenberg's plant.

2. L. *atro-cinérea*, (*ashy-black Lecidea*); crust tessellated greyish-black smooth, apothecia several together depressed brownish-black with a pale border at length crowded elevated the border being obliterated. *Sm.—Lichen atro-cinereus, Dicks. Cr. Fasc.* 3. *p.* 14. *t.* 2. *f.* 2. *E. Bot. t.* 2096. (*excl. the synonyms?*).

On rocks, *Mr. Dickson.*—This, Mr. Borrer has not noticed in his MS. list: but I presume it is unintentionally omitted.

3. L. *atro-álba*, Ach. (*black and white Lecidea*); crust indeterminate very thin continuous black with grey roughish convex crowded warts, apothecia in the interstices coal-black flattish at length convex with an elevated black border. *Sm.—Ach. Syn. p.* 11.—*Lichen atro-albus, Linn.—E. Bot. t.* 2336.

Rocks in the north of England, *Mr. Turner.*

4. L. *verruculósa*, Borr. MSS. (*white-warted Lecidea*); crust indeterminate very thin fibrous black with white convex crowded smooth warts, apothecia solitary in each wart depressed coal-black with a border of the same colour. *Lichen verruculosus, E. Bot. t.* 2317.

On rocks, Durham, *Mr. Winch.*

5. L. *fusco-átra*, Ach. (*brownish-black Lecidea*); crust greyish black thin circular with a fine radiated compound inky border, apothecia sessile flattish coal-black with a thick elevated margin of their own substance and colour. *Sm.—Ach. Syn. p.* 12.—*Lichen dendriticus, Dicks. Cr. Fasc. p.* 14. *E. Bot. t.* 1734.

Rocks and stones, especially flint and quartz.—The *Patellaria fusco-atra, Hoffm.* (*Pl. Lich. t.* 54. *f.* 1.), Mr. Borrer remarks, is more like *L. atro-alba* or *fumosa.*

6. L. *cechúmena*, Ach. Meth. (*confused black and olive Lecidea*); crust determinate tessellated olive-grey with blackish cracks, apothecia black at length convex with a black border of their own substance. *Ach. Meth. p.* 42.—*Lichen cechumenus, E. Bot. t.* 1830. —*Lecidea fumosa, Ach. Syn. p.* 12.—*β. athrocarpa;* crust determinate tessellated pale brownish-olive polished its fragments tumid and angular, apothecia sunk black flattish crowded with a narrow whitish spurious border. *Sm.*—*Ach. Lich. Univ. p.* 157.

a. On granite and whin-stone rocks, N. of England, *Rev. Mr. Harriman.*—*β.* Rocks in mountainous places, Durham, *Rev. Mr. Harriman.*—The *β. athrocarpa* Mr. Borrer observes, "Acharius makes a *var.* of *L. cechumena* in *Lich. Univ.* and in the Synopsis joins the two and gives them as a synonym of *L. fumosa.* He also quotes the *Lichen gibbosus*, Dicks, as sent by Harriman." I know too little of these Lichens to offer an opinion. If such men as Acharius and Borrer are in doubt about a common Lichen, who then shall venture to decide?

7. L. *petræ'a*, Ach. (*rock Lecidea*); crust thin orbicular minutely warted somewhat powdery white, apothecia innate with the crust protuberant somewhat concentric black. *Ach. Syn. p.* 13.—*Lichen petræus, Jacq. Coll. v.* 3. *p.* 116. *t.* 6. *f.* 2. *L. Lichen concentricus, Davies.*—*Dicks.*—*E. Bot. t.* 246.

Rocks and stones, *Mr. Dickson.*

8. L. *cónfluens*, Ash. (*confluent-shielded Lecidea*); crust somewhat uneven tessellated of a smoky white, apothecia sessile black with a black border at length convex confluent and angular. *Sm.*—*Ach. Syn. p.* 16.—*Lichen confluens, E. Bot. t.* 1964.

On rocks and stones, frequent.—Acharius observes that the *crust* is sometimes suffused with an ochraceous tinge, and that sometimes it is wanting.

9. L. *lapícida*, Ach. (*contiguous-shielded Lecidea*); crust glaucous-white tessellated and granulated depressed flattish angular black with a narrow black elevated border. *Sm.*—*Ach. Syn. p.* 13.—*Lichen contiguus, E. Bot. t.* 821. (*vix Verrucaria contigua, Hoffm.*)—*β. diacapsis;* crust bluish-white tartareous its surface composed of minute undulations, apothecia clustered somewhat sunk, their disk flat black or brown their border thick externally black its inner edge whitish. *Sm.*—*Urceolaria diacapsis, Ach. Syn. p.* 142.—*Lichen diacapsis, E. Bot. t.* 1954.

On brick-walls.—*β.* Lancashire and Durham.—At the suggestion of Mr. Borrer, I refer the *Lichen diacapsis, E. Bot.* (*Urceolaria, Ach.*) to this species:—the *Verrucaria contigua*, the same Botanist considers as belonging to *Lec. viridi-atra, Ach.*

10. L. *promínula*, Borr. (*prominent small-shielded warty Lecidea*); crust thin somewhat tartareous minutely warty smoky-grey or brownish, apothecia superficial small black internally grey, disk flat, the border slightly elevated mostly entire. *Borr.*

in E. Bot. Suppl. t. 2687. *f.* 1.—β. crust brown more level minutely cracked.

On flints, which have been long exposed to the weather, Sussex Downs.—β. on a block of close-grained sandstone on the sea-shore near Rye, *Mr. Borrer.*—"The substratum of the *thallus* is more obscure and the warts are more minute and less distinct in *L. prominula* than in *L. atro-alba*. The *apothecia* too are superficial, not sunk, as in that and several other of the verrucose *Lecideæ*, in the interstices of the warts. Their site, number, and uniformly small size, give the plant some resemblance to *L. pinicola*, from which it differs widely in its *thallus*, as well as in the place of growth; nor indeed are the *patellulæ* so minute as in that Lichen." *Borr.*

11. L. *chalybea*, Borr. (*metallic-black Lecidea*); crust thin leaden-black glossy at length somewhat tartareous minutely cracked and opaque, apothecia superficial minute black, the disk flat, the border slightly elevated entire. *Borr. in E. Bot. Suppl. t.* 2687. *f.* 2.

On tiles and occasionally on flint, in various places in Sussex; and perhaps not uncommon elsewhere, since it is likely to be overlooked among *Lecanora exigua* and other minute *Lichens*, which form, in such situations, the first crop of vegetation. *Borr.*

12. L. *prémnea*, Ach. (*rough-bordered Lecidea*); crust thin submembranaceous rather soft greyish, apothecia plane sessile black, the disk internally cartilaginous and white, the border elevated somewhat wrinkled at length flexuose. *Ach. Syn. p.* 17.

On trunks of trees, *Mr. Borrer*, (Sussex?)—I introduce this on the authority of Mr. Borrer, not having seen a specimen, nor is it stated in what part of England it is found.

13. L. *paraséma*, Ach. Meth. (*common black-shielded Lecidea*); crust thin greyish uninterrupted somewhat granulated black-edged, apothecia sessile flat opaque black with a black smooth border at length convex. *Sm.*—*Ach. Syn. p.* 17—*L. elæochroma, Ach. Syn. p.* 18. ("*certainly*," *Mr. Borrer*)—*Lichen parasemus, E. Bot. t.* 1450.

On the smooth bark of trees, abundant.—Mr. Borrer refers our well-known *L. parasema* to the *L. elæochroma, Ach. Syn.* (the *L. parasema, elæochroma, Lich. Univ. p.* 275.), and he observes, "if *L. parasema* of the *Syn.* be really distinct, I know not what it is."

14. L. *pinícola*, Borr. MSS. (*Pine-bark Lecidea*); crust diffuse thin brownish-white somewhat tartareous apothecia numerous very minute very black opaque with a black smooth elevated border. *Sm.*—*Lichen pinicola, Ach. Meth. p.* 66. *E. Bot. t.* 1851.—*Lecidea parasema*, b. *and* d. *Ach. Syn. p.* 17 *and* 18. (*according to Mr. Borrer*).

On the scaly bark of old Pine-trees.

15. L. *dúbia*, Turn. and Borr. MSS. (*doubtful Board Lecidea*); crust leprous pale-brownish grey indeterminate, apothecia black

convex slightly immersed in the crust bordered when young. *Sm.*—*Lichen dubius, E. Bot. t.* 2347.

Common on boarded buildings. *Smith.*

16. L. *Griffithii*, (*Griffithian Lecidea*); crust thin white smooth, apothecia sessile scattered pale purplish waxy-brown with a smooth border of the same colour blackened in decay. *Sm.*—*Lichen Griffithii, E. Bot. t.* 1735.—*Lecidea enteroleuca, Ach. Syn. p.* 19. (*Borrer.*)—*Lichen corneus, With.*—*Hull.*

On Oak and Birch bark.

17. L. *Gágei*, (*rusty spongy-crusted Lecidea*); crust dispersed minutely granulated somewhat fibrous bibulous of a tawny olive, apothecia minute blackish-brown with a paler border of their own substance finally convex and deprived of their border. *Sm.*—*Lichen dolosus, E. Bot. t.* 2581. (*not Ach., according to Mr. Borrer.*)

On a rock called O'Donoghue's prison, at Killarney, *Sir T. Gage, Bart.*—The *Lecidea dolosa* of Ach., Mr. Borrer informs me is only a *var.* of *L. parasema.*

18. L. *aromática*, Turn. MSS. (*aromatic Lecidea*); crust strongly rooted (?) indeterminate of irregular minute crowded smooth greyish-white portions, apothecia in the interstices black round concave with a thick black border. *Sm.*—*Lichen aromaticus, E. Bot. t.* 1777.

On old flint walls in Norfolk and Suffolk, especially where there is a stratum of earth or moss, *Mr. D. Turner.*—The fragrant scent of this Lichen, when bruised, is very remarkable. Sir J. E. Smith ranks it with the *L. cæruleo-nigricans;* and if that be its affinity, it would be a *Psora* of this arrangement. I rather follow Mr. Borrer, in placing it among the true *Lecideæ.*

19. L. *sanguinária*, Ach. (*sanguineous Lecidea*); crust thickish rugulose or warted greyish-white somewhat polished, apothecia at length convex hemisphærical subtuberculated black and horny within upon a bright-red stratum.—*Ach. Syn. p.* 19.—*Lichen sanguinarius, E. Bot. t.* 155.

On rocks and trees, especially in subalpine districts.

20. L. *muscórum*, (*Moss Lecidea*); crust determinate granulated grey somewhat lobed and branched, apothecia crowded black elevated at length somewhat turbinated.—*Lichen muscorum*, "*Linn. Meth. Musc. p.* 36. *Relh. Cant. p.* 424. *t.* 5. *Dicks. Cr. Pl.* 59." *E. Bot. t.* 626.—*Lecidea sabuletorum, Flörke.*—*Ach. Syn. p.* 20. (*Borrer.*)

On mosses, Gogmagog hills, near Cambridge, *Mr. Relhan;* and elsewhere.

21. L. *viridi-átra*, Ach. (*rough tartar-crusted Lecidea*); crust continued tartareous cracked tumid uneven and granulated pale brownish-grey, apothecia in the interstices crowded flattish black at length convex with a very thin black border. *Sm.*—*Ach. Syn. p.* 21.—*Lichen miscellus, E. Bot. t.* 1831. (*not Lecidea*

miscella, Ach. Syn. p. 21. ?) — *Patellaria contigua, Hoffm. Pl. Lich.*

On whin-stone rocks, Durham, *Rev. Mr. Harriman.* — Mr. Borrer probably considers the *Lecidea miscella* of Acharius, as different from the *Lichen miscellus* E. Bot., since he does not notice it under that plant: yet Sir Jas. E. Smith says that Mr. Harriman's specimens were pronounced by Acharius to be the same.

22. L. *geográphica*, (*Map Lecidea*); crust bright-yellow smooth cracked and tessellated with a black margin and black between the areolæ, apothecia nearly flat and irregular often confluent even with the crust black throughout. — *Lichen geographicus, Linn. Sp. Pl. p.* 1607. *E. Bot. t.* 245.—*L. atro-virens, Linn. Sp. Pl. p.* 1607.—*Lecidea atro-virens, var.* b. *geographica, Ach. Syn. p.* 21. — *Dill. Musc. t.* 18. *f.* 5.

On rocks and stones, chiefly of trap-formation, in subalpine and especially mountainous countries. — It seems to be generally allowed that the *Lichen geographicus* and *atro-virens* of Linn. constitute one species; and surely the former name, so expressive of its character, is the one to be preferred.

23. L. *silácea*, Ach. (*yellow ochrey Lecidea*); crust uneven tessellated yellowish-red, apothecia sessile black with a narrow black border at length convex often confluent.—*Ach. Syn. p.* 22. —*Lichen silaceus, E. Bot. t.* 1118.

On rocks, frequent.

24. L. *Œdéri*, Ach. (*Oederian Lecidea*); crust thin tessellated of a rusty red, apothecia minute somewhat globose a little immersed concave black with a thick black border. *Sm.—Ach. Syn. p.* 22.—*Lichen Œderi, E. Bot. t.* 1117.—*L. cæsius, Dicks. Cr. Fasc.* 2. *p.* 19. *t.* 6. *f.* 6.—*L. Dicksoni, With.*— *Urceolaria Œderi, Schær. Lich. Helv. p.* 69. *n.* 123.

Rocks, in the north of England and Scotland.—This differs from the preceding in its deeper colour, and in its more numerous and smaller *apothecia* with their broad *border*. Mr. Schærar considers it to be a true *Urceolaria*.

25. L. *flavo-viréscens*, Borr. MSS. (*Lemon-coloured Lecidea*); crust leprous granulated friable lemon-coloured, apothecia black globose solitary or aggregated. *Sm.* — *Lichen flavo-virescens, Dicks. Cr. Fasc.* 3. *p.* 13. *t.* 8. *f.* 9. — *Lecidea citrinella, Ach. Syn. p.* 25.—*Lichen citrin., E. Bot. t.* 1877.

On the ground, in sandy places.

26. L. *scabrósa*, Ach. Meth. (*rugged-shielded Sulphur Lecidea*); crust powdery pale yellowish-green, apothecia sunk in the crust aggregate black with an elevated black border. *Sm.*— *Lichen scabrosus, E. Bot. t.* 1878.—*Lecidea citrinella, β. scabrosa, Ach. Syn. p.* 25.

On tiled roofs and on flints, in Sussex, *Mr. Borrer.*—This has a great affinity to the last, with which Acharius and Wahlenberg join it: its *crust* is "thinner, of a paler green, more truly powdery and less granulated; the *apothecia* are sunk, so as to be on a level with the crust, and they have a thick border."

27. L. *uliginósa*, Ach. (*earthy Marsh Lecidea*); crust olive-brown granulated subgelatinous, apothecia black flattish with a black smooth border at length convex and clustered. *Ach. Syn. p.* 25.—*Lichen ulig., Schrad.*—*E. Bot. t.* 1466.

Sandy heaths, near Yarmouth, *Mr. D. Turner.* Surrey, *Mr. Borrer.*

28. L. *synóthea*, Ach. (*minute crowded Lecidea*); crust indeterminate somewhat gelatinous minutely granulose uneven sooty-brown, apothecia minute dull brownish-black pale within at length convex, the border narrow evanescent. *Borr.* — *Ach. Syn. p.* 26. *Borr. in E. Bot. t.* 2711.

On the surface of squared rails of oak and deal at Esher, Surrey, and Henfield and Boxgrove, Sussex, *Mr. Borrer.* — "It requires a practised eye to distinguish this species from other obscure Lichens, which usually grow on rails; but its structure is found, upon examination, to be peculiar. It has a near affinity to *L. uliginosa.*" *Borr.*

29. L. *símplex*, Borr. MSS. (*simple black-shielded Lecidea*); crust olive thin smooth scattered soon disappearing, apothecia scattered or crowded olive-black with a thick elevated blackish border at length rugged and contorted. *Sm.*— *Lichen simplex, Dav. in Linn. Trans. v.* 2. *p.* 283. *t.* 28. *f.* 2. *E. Bot. t.* 2152. (the figure on slate-rock).—*Opegrapha Persoonii, β. Ach. Syn. p.* 71.

On slate and sandstone rocks, in various parts of Great Britain. *Sm.*

30. L. *immérsa, Ach.* (*sunken Lecidea*); crust spreading thin subcontinuous whitish, apothecia plano-convex immersed in the stone bordered black, the disk subpruinose blackish-red when moist, at length rather convex whitish within. *Ach. Syn. p.* 27. — *Lichen immersus, With.*—*E. Bot. t.* 193.

On calcareous rocks.—In general appearance, this Lichen is very closely allied to *Verrucaria Schraderi;* but the *apothecia* are those of a *Lecidea.*

31. L. *rivulósa*, Ach. (*branching-lined Lecidea*); crust brownish-grey cracked bordered and intersected by dark serpentine branching lines, apothecia scattered sessile black flat with a wavy border of their own substance but somewhat paler. *Sm.* — *Ach. Syn. p.* 28.—*Lichen rivulosus, E. Bot. t.* 1737.

On rocks, frequent.

32. L. *pruinósa*, Ach. Meth. (*frosty-shielded Lecidea*); crust leprous thin scattered greyish-white, apothecia slightly convex irregularly shaped rusty-black with a grey bloom when dry and a thin black smooth border. *Sm.*—*Lichen pruinosus, Dicks. Cr. Fasc.* 3. *p.* 15. *t.* 9. *f.* 4. *E. Bot. t.* 2244. — *Lecidea albo-cærulescens, Ach. Syn. p.* 29.

Limestone wall near Gainford, Durham, *Rev. Mr. Harriman.*

33. L. *abietína*, Ach. (*Spruce-bark Lecidea*); crust spreading very thin smooth even pale-glaucous, apothecia sessile flattish black clothed with pale powder, their border black. *Sm.* —

Ach. Syn. p. 30. — *Lichen abietinus, Ach. Prodr.* — *E. Bot. t.* 1682.

On the bark of different species of Fir.

34. L. *speiréa*, Ach. (*veiled black-shielded Lecidea*); crust tartareous uninterrupted slightly tessellated very white, apothecia sessile flat covered with a grey bloom at length elevated convex very black with a white (paler) border. *Sm.—Ach. Syn. p.* 31. — *Lichen speireus, E. Bot. t.* 1864. — *L. rimosus, E. Bot. t.* 1736. (*according to Acharius*).

On flinty pebbles on the summits of the cliffs, near Newhaven, Sussex, *Mr. Borrer.*

35. L. *albo-átra*, Borr. MSS. (*black and white Lecidea*); crust spreading cracked somewhat mealy white, apothecia sunk even with the crust small crowded black clothed with a grey bloom. — *α. corticola. Verrucaria albo-atra, Hoffm. Pl. Lich. v.* 1. *p.* 76. *t.* 15. *f.* 2. — *Lecidea corticola, Ach. Syn. p.* 32. — *Lichen corticola, E. Bot. t.* 1892. — *β. saxicola. Lecidea epipolia, Ach. Syn. p.* 32. — *Lichen epip., E. Bot. t.* 1137. — *L. candidus, E. Bot. t.* 1138. (*not Lecidea candida, Ach.*)

α. Old trees, frequent. *β.* On stone buildings, Norfolk and Suffolk. — At Mr. Borrer's suggestion, I have referred the *Lichen candidus* of *E. Bot.* to this (as an old state of it), united the *Lecidea epipolia* with the *L. corticola*, and restored the old name of Hoffmann. The true *L. candida* of Ach. (*Lichen tumidulus, Sm.*) does not appear to be British.

36. L. *Lightfóotii*, Ach. (*Lightfootian Lecidea*); crust tartareous granulated greenish-white black-edged, apothecia sunk flat at length convex polished black with a black smooth border. *Sm.—Ach. Syn. p.* 34. — *Lichen Lightfootii, E. Bot. t.* 1451.

Bark of trees; not very unfrequent.

37. L. *incómpta*, Borr. (*loose mealy-crusted Lecidea*); crust indeterminate coarsely mealy uneven olive-green, apothecia superficial small purplish-black the disk at length convex the border narrow flexuose. *Borr. in E. Bot. Suppl. t.* 2699.

In large patches, on the shaded parts of rugged trunks of old Elms, at Shermanbury and Hurst-pierpoint, Sussex, *Mr. Borrer.* — "The *apothecia* of this bear much resemblance to those of *L. æruginosa* and *L. Lightfootii;* but the *thallus* is essentially different in structure, being formed, from the first, of coarse loose particles, not of granules, scattered on a filmy substance." *Borr.*

38. L. *quérnea*, Ach. (*Oak Lecidea*); crust leprous pale brownish-yellow, apothecia slightly immersed in the crust convex dark-brown nearly black when dry, the border obsolete. *Ach. Syn. p.* 36. — *Lichen querneus, Dicks. Cr. Fasc.* 1. *p.* 9. *t.* 2. *f.* 3. *E. Bot. t.* 485.

In the clefts of the bark of Oak-trees, in exposed situations.

39. L. *viridéscens*, Ach. (*greenish horny-tubercled Lecidea*); crust thin mealy indeterminate scattered pale-green, apothecia

numerous convex rugged brown semitransparent at length blackish. *Ach. Syn. p.* 36.—*Lichen viridescens, Schrad.*—*E. Bot. t.* 2217.—*Lichen hypnophila, Turn. in Ach. Lich. Univ. p.* 199. (*which Acharius has now strangely referred to L. fusco-lutea in the Synopsis. Borr.*).

On mosses and old walls and ruins in Norfolk.—Mr. Turner and Mr. Borrer have both expressed an opinion that this is probably not really distinct from *L. vernalis;* but Sir J. E. Smith observes that the *apothecia* have no elevated border, nor are they, when full-grown, of so light a colour.

40. L. *pulvérea*, Borr. (*pale-green mealy black-shielded Lecidea*); crust indeterminate soft mealy pale greyish-green, apothecia sessile largish black internally pale, the border livid slightly raised evanescent. *Borr. in E. Bot. Suppl. t.* 2726.

On Oak-bark in the New Forest, Hants, *C. Lyell, Esq.* South of Ireland, spreading over mosses, *Miss Hutchins.*—"It has been suspected that this Lichen might be a *var.* of *L. incana;* but Mr. Lyell sent it as distinct, and Miss Hutchins maintained the same opinion, observing that she found the *apothecia* of all ages constantly black. It may be added that their substance is not so thick, and their border, especially when young, is narrower and less rounded." *Borr.*

** *Apothecia brown, reddish-yellow or flesh-coloured, never (or rarely) black.*

41. L. *incána*, (*soft mealy-crusted Lecidea*); crust leprous very mealy soft uneven greenish-grey, apothecia scattered sessile brown with a paler brown even smooth border. *Sm.*—*Ach. Syn. p.* 36.—*Lichen incanus, E. Bot. t.* 1683.—*Lepraria incana, Ach. Lich. Univ. p.* 665.—*Byssus incana, Linn.?*—*Dill. Musc. t.* 1. *f.* 3.

On trees, shady rocks, and banks, frequent; very rare in fruit; first discovered in that state by *C. Lyell, Esq.* in the N. Forest, Hants. Sussex, *Mr. Turner and Mr. Borrer.*

42. L. *sulphúrea*, Ach. (*sulphureous Lecidea*); crust thick cracked rugged dull sulphur-coloured, apothecia convex brown mealy with a paler margin.—*Ach. Syn. p.* 37.—*Lichen sulphureus, E. Bot. t.* 1186.—*Verrucaria sulph. Hoffm.*

Rocks, stones and brick walls, in open situations.

43. L. *expállens*, Borr. MSS. (*pale yellow-green Lecidea*); crust thin powdery spreading pale greenish sulphur-coloured, apothecia sessile pale buff with a powdery edge at length convex rugged without a border. *Sm.*—*Lecanora expallens, Ach. Syn. p.* 171.—*Lichen orostheus, E. Bot. t.* 1549. (*not Ach.?*)

Trees and rocks; on the latter in shaded situations.—Mr. Borrer says that the *L. orosthea* of *Ach.* seems to connect this *L. sulphurea.*

44. L. *æruginósa*, Borr. (*dark-green powdery Lecidea*); crust indeterminate granulose greenish-grey, at length covered with æruginose powder, apothecia superficial small dull-black brownish or reddish the disk flat the border elevated somewhat flexuose. *Borr. in E. Bot. Suppl. t.* 2682.

Common in Sussex, on decaying rails, but rarely producing *apothecia*, *Mr. Borrer.*—"In the structure of the *thallus*, this Lichen differs but little from *L. scabrosa*, *E. Bot. t.* 1878., which, when growing on a compact substance, is found to begin in the same manner, with a film and minute granulations; but the powder which soon covers the surface is, in that species, of a paler and more yellow hue, and the structure of its *patellulæ* is different. *L. æruginosa* is perhaps more nearly allied to *L. quadricolor*, *E. Bot. t.* 1158. Indeed it must be admitted that these two recede more in general appearance than in any essential character, yet it would be scarcely justifiable to regard them as one species. In *L. æruginosa* the granulations of the thallus are smaller, more crowded and confluent, and of a greener hue, and the powder they produce is much more copious and of a dark verdigris-green, whilst that in *L. quadricolor* is not much darker than the granules. The *apothecia* also are smaller in *L. æruginosa*, their margin, perhaps, more elevated, and their colour not altogether so variable. From another nearly allied species, *L. Lightfootii*, *E. Bot. t.* 1451., the present differs in most of these and in some additional particulars." *Borr.* From the variable colour of the *apothecia* of this species, it will be seen that it has an equal claim to rank with the former as the present section of the Genus, a section eminently artificial.

45. L. *quadrícolor*, Borr. MSS. (*four-coloured Lecidea*); crust leprous-grey with white granulations, young apothecia gelatinous flesh-coloured with a pale border old ones blackish. *Sm.*—*Lichen quadricolor*, *Dicks. Cr. Fasc.* 3. *p.* 15. *t.* 9. *f.* 3. *E. Bot. t.* 1185.—*Lecidea decolorans*, *Flörke.*—*Ach. Syn. p.* 37. *and β. granulosa, of the same.*—*L. escharoides*, *L. desertorum* and *L. artyta*, *Ach. Lich. Univ.* (*Borrer*).

On the ground, in heathy and sandy places, in perfection during the moist winter-months.

46. L. *coronáta*, Borr. MSS. (*crenate-shielded Lecidea*); crust of minute granulations scarcely lobed and imbricated, warts or scales olive-brown, apothecia crowded flattish red-brown their border elevated narrow crenate. *Sm.*—*Verrucaria* and *Psora coronata*, *Hoffm.*—*Lichen granulosus* and *L. pezizoides*, *Dicks.*—*Lichen brunneus*, *E. Bot. t.* 1246.—*Lecanora brunnea*, *β. coronata*, *Ach. Syn. p.* 192.—*β. escharoides;* crust brownish ash-coloured composed of granulated warts, apothecia convex irregular black with an obsolete black border. *Lichen escharoides*, *E. Bot. t.* 1247. (*not Ach.*).

On the earth, among turf or decayed mosses.—*β.* on turfy ground or on rocks, Cornwall, and at Yarmouth, *Mr. Turner.*—Mr. Borrer considers the *Lichen escharoides* of *E. Bot.* to belong to this species; I have therefore made it the *var. β.*

47. L. *anómala*, Ach. (*tumid brown-shielded Lecidea*); crust very thin continued smoothish glaucous-white, apothecia scattered small sessile brown with a light border of their own substance at length hemisphærical blackish the border disappearing. *Sm.*—*Ach. Syn. p.* 38.—*Lichen cyrtellus*, *E. Bot. t.* 2155. *β. effusa;* crust thin powdery light-green, apothecia pale waxy-brown with a paler border at length convex without any bor-

der. *Lichen effusus, E. Bot. t.* 1863. *upper figure.*—*Lecanora effusa, Ach. Syn. p.* 159.

a. On the trunks of trees. *β.* Common in similar situations, about Yarmouth, in Hampshire and Sussex.—Mr. Borrer only refers the upper figure of *Lichen effusus, E. Bot.* to this species; the lower represents the *Lecidea pineti Ach.* which may also be a *var.*, and the *Lecanora effusa* "is scarcely distinct, and I believe is what Acharius in his *Lich. Univ.* calls his *var. ε. tenebricosa.*"

48. L. *rupéstris*, Ach. (*Rock Lecidea*); crust thin tartareous contiguous greyish-white, apothecia minute immersed plane at length convex bordered the border subpersistent glabrous reddish-brown of the same colour within. *Ach. Syn. p.* 39.—*Lichen rupestris, Scop.* (*not E. Bot.*)—*L. calvus, Dicks. Cr. Fasc.* 2. *p.* 18. *t.* 6. *f.* 4. *E. Bot. t.* 948.

Calcareous rocks.

49. L. *irrubáta*, Ach.? (*orange-red Lecidea*); crust thin dispersed greenish-grey, apothecia sunk flat bordered at length convex smooth deprived of border reddish orange-coloured. *Sm.*—*Ach. Syn. p.* 40.? (*Borr.*)—*Lichen rupestris, E. Bot. t.* 2245. (*excl. the Synonyms.*)

Walls at Beamish, Durham, *Mr. Winch.*

50. L. *vernális*, Borr. MSS. (*vernal Lecidea*); crust thin powdery whitish-green, apothecia at length almost globose clustered of a rusty flesh-colour. *Sm.*—*Ach. Syn. p.* 36.?—*Lichen vernalis, Linn.* (*Sm.*) *E. Bot. t.* 845.—*Lecidea luteola, Ach. Syn. p.* 41.—*Lichen porriginosus, Turn. in Linn. Trans. p.* 94. *t.* 8. *f.* 4.—*Lichen sphæroides, Dicks. Cr. Fasc.* 1. *p.* 9. *t.* 2. *f.* 2.

On the bark of trees, frequently coating mosses.

51. L. *pinéti*, Ach. (*waxy-shielded Pine Lecidea*); crust very thin sordid greenish-grey, apothecia sessile minute waxy urceolate yellow-flesh-colour with an entire border. *Ach. Syn. p.* 41.—*Lichen effusus, E. Bot. t.* 1863. *lower figure.*

On the dead scales of Fir-bark, near the ground, Costessey, near Norwich.

52. L. *córnea*, Ach. Meth. (*horny-cupped Lecidea*); crust mealy thin white, apothecia a little elevated brown semi-transparent with a thick elevated even smooth paler border. *Sm.*—*Lichen corneus, With.*—*E. Bot. t.* 965.—*Lecidea carneola, Ach. Syn. p.* 42.

On Oaks in Denbighshire and the N. of England.

53. L. *fusco-lútea*, Ach. (*brownish-yellow Lecidea*); crust thin continued even very white and smooth, apothecia elevated flat dull-yellow or reddish-brown with a border of the same colour. *Ach. Syn. p.* 42.—*Lichen fusco-luteus, Dicks. Cr. Fasc.* 2. *t.* 6. *f.* 2. *E. Bot. t.* 1007.

On elevated mountains, incrusting decayed mosses, frequent.—On the Scottish mountains this is not unfrequent, and is rendered very conspicuous by the rather bright reddish or orange-brown *shields*, on a white *thallus*.

54. L. *ferrugínea*, (*rusty-shielded Lecidea*); crust spreading thin rugged greyish-white, apothecia rusty-orange at length convex with a waved border of the same colour.—*Lichen ferrugineus, Huds. Angl. p.* 526. *E. Bot. t.* 1650.—*Lecanora cinereo-fusca, Ach. Syn. p.* 43.—*L. cæsio-rufa, Ach. Syn. p.* 44.

On rocks and stones, and on the bark of trees.

55. L. *subcárnea*, Ach. (*flesh-coloured fruited Lecidea*); crust tartareous subdeterminate cracked white, apothecia flesh-coloured at length convex conglomerate distorted the disk smooth pruinose the border naked prominent. *Ach. Syn. p.* 45.

Rocks, Scotland, *M. Dickson in Mr. Borrer's Herb.*

56. L. *icmadóphila*, Ach. (*Heath Lecidea*); crust leprous unequal granulated greenish-white, apothecia nearly sessile plane flesh-coloured at length flexuose and the disk wrinkled with an obsolete border. *Ach. Syn. p.* 45.—*Lichen icmadophila, Linn. Suppl. p.* 450.—*Lichen ericetorum, Ehrh.*—*E. Bot. t.* 372.

Turfy places, under the shade of heath, frequent.—Linnæus confounded this with the *Bœomyces roseus*, which the *apothecia* somewhat resemble in size, as they and the *crust* do in colour.

57. L. *privígna*, Ach. Meth. (*obsolete-crusted Lecidea*); crust scarcely any, apothecia sessile concave olive-brown with a thick elevated border darker than the disk.—*Ach. Meth. p.* 49. —*Lecanora milvina, β. privigna, Ach. Syn. p.* 151.—*Lichen simplex, E. Bot. t.* 2152. (*the figure on sandstone.*)

On white sandstone, Durham, *Rev. Mr. Harriman.*—This I am only acquainted with from the figure in *E. Bot.* For the synonyms I stand indebted to Mr. Borrer.

58. L. *marmórea*, Ach. (*salmon-coloured Lecidea*); crust pale thin scattered, apothecia subglobose salmon-coloured at length urceolate with a very thick elevated inflexed pale flesh-coloured often crenate border sometimes a little pulverulent.—*Ach. Syn. p.* 46.—*Lichen marmoreus, Dicks. Cr. Fasc.* 2. *p.* 18. *E. Bot. t.* 739.—*L. cupularis, Hedw. St. Cr. v.* 2. *p.* 58. *t.* 20. *f. B.*—*L. tricolor, With.*—*Gyalecta cupularis, Schær. Lich. Helv. p.* 79. *n.* 135.

On rocks, especially schistose and calcareous, often spreading over decayed mosses, chiefly in subalpine countries.

59. L. *alabastrína*, Ach. (*Alabaster Lecidea*); crust thin smooth and subpruinose white and subglaucescent, apothecia plano-convex entire of the same colour as the crust the disk whitish rose-colour. *Ach. Syn. p.* 46.—*Lichen rosellus, E. Bot. t.* 1651.?

Trees, New Forest, Hants, *Miss Biddulph.* Scotland, *Mr. D. Turner*, (if *L. rosellus, E. Bot.* be the same).—This is as unknown to me as it is to Mr. Borrer, who, however, observes that Acharius appears to have had it from England; and that he regards the *Lichen rosellus* of *E. Bot.* as a doubtful specimen of the same plant.

60. L. *lútea*, Borr. MSS. (*yellow-shielded Lecidea*); crust thin powdery pale ash-coloured, apothecia plano-convex deep yellow with a paler elevated border.—*Lichen luteus*, *Dicks. Cr. Fasc.* 1. *p.* 11. *t.* 2. *f.* 6. *E. Bot. t.* 1263.—*Lecidea melizea*, *Ach. Syn. p.* 47.

Mossy trunks of trees, *Mr. Dickson.* In a wood near Bangor, *Mr. D. Turner.*

61. L. *Ehrhartiána*, Ach. (*Ehrhartian Lecidea*); crust rugged granulated greenish-white studded with black warts (parasitic substances?), apothecia bordered yellowish at length convex waved deformed and clustered. *Sm.*—*Ach. Syn. p.* 47. (*excl. var.* β.)—*Lichen Ehrhartianus*, *E. Bot. t.* 1136.—*Lichen graniformis*, *E. Bot. t.* 1464. (*as to the crust*).

On wooden barns, Norfolk, *Mr. Turner.*

62. L. *polýtropa*, Ach. Meth. (*horn-coloured Lecidea*); crust tartareous tessellated and broken into little testaceous scales or grains, apothecia numerous plane at length convex bordered angular yellowish-flesh-coloured at length subglobose and deprived of border.—*Lichen polytropus*, *Ehrh.*—*E. Bot. t.* 1264. *lower figure* (*Borr.*).—*Lecidea Ehrhartiana*, β. *polytropa*, *Ach. Syn. p.* 47.

Rocks, in the north of England and Scotland.

63. L. *intricáta*, Borr. MSS. (*variable Lecidea*); crust tessellated smooth greenish-sulphur-coloured and black, apothecia numerous convex bordered angular yellowish-flesh-coloured turning to olive dark purple and black. *Sm.*—*Lecanora intricata*, *Ach. Syn. p.* 154. (*Borr.*).—*Lichen intricatus*, *Schrad.*—*Lichen polytropus*, *E. Bot. t.* 1264. *upper figure* (*Borr.*).

Sandstone rocks, in the North of England.

64. L. *lúcida*, Ach. (*lemon-coloured Rock Lecidea*); crust thin powdery brittle pale greenish-lemon-coloured, apothecia small sessile convex lemon-coloured without a border. *Sm.*—*Ach. Syn. p.* 48.—*Lichen lucidus*, *Ach. Prodr.*—*E. Bot. t.* 1550.

On hard sandstone rocks about Liverpool, *Sir J. E. Smith.* Sussex, *Mr. Borrer.*

65. L. *atro-fláva*, Turn. (*black and yellow Stone Lecidea*); crust indeterminate membranous thin somewhat granulated black, apothecia numerous small flattish full-yellow with an entire elevated somewhat paler border. *Sm.*—*Turn. in Linn. Trans. v.* 9. *p.* 142. *t.* 11. *f.* 2.—*Lichen atro-flavus*, *E. Bot. t.* 2009.—*Lecidea Turneriana*, *Ach. Syn. p.* 49.

On loose exposed flint-stones in Sussex, *Mr. Borrer.* Near Bury, *Rev. G. R. Leathes.*

66. L. *ulmícola*, Borr. MSS. (*white and yellow Lecidea*); crust leprous white very thin and even, apothecia orange-coloured when young flattish with a border of their own colour at length

convex without a border. *Sm.* — *Patellaria ulmicola, DC.* — *Lecidea luteo-alba, Ach. Syn. p.* 49. — *Lichen luteo-albus, Turn. in Linn. Trans. v.* 7. *p.* 92. *t.* 8. *f.* 3. *E. Bot. t.* 1426.

On the bark of trees, in various parts of England.

67. L. *aurantíaca,* Ach. (*saffron-coloured Lecidea*); crust granulated whitish-lemon-coloured, apothecia sessile rather convex orange-coloured with a yellow waved border. *Sm.* — *Ach. Syn. p.* 50. — *Lichen aurantiacus, Lightf.* — *Lichen salicinus, Schrad.* — *E. Bot. t.* 1305. — *Lecanora salicina, Ach. Syn. p.* 175.

On the trunks of trees, especially of Willow and Poplar. — Mr. Borrer has determined this to be the *Lichen aurantiacus* of Lightfoot, whose older appellation I consequently prefer.

68. L. *erythrélla,* Borr. MSS. (*orange Stone Lecidea*); crust lemon-coloured thin dispersed in minute angular smooth fragments, apothecia sessile deep orange with a lighter border at length becoming nearly globose and the border obliterated. *Sm.* — *Lecanora erythrella, Ach. Syn. p.* 175. — *Lichen erythrellus, E. Bot. t.* 1993.

On rocks and stone-walls : not unfrequent in the Highlands of Scotland. — Mr. Borrer thinks it is scarcely distinct from the preceding.

14. Lecanóra. *Ach.* Lecanora.

Thallus crustaceous, spreading, plane, adnate, uniform. *Apothecia* (*patellulæ*) orbicular, thick, sessile and adnate, the *disk* plano-convex, its *border* thickish, formed of the *crust* and of the same colour.—Name ; λεκανιον, a *small shield,* and ωρα, *form ;* from the form of the apothecia.—Our valued and learned friend, Mr. Borrer, says he adopts the Genus *Lecanora* with reluctance, as distinguished by an unsatisfactory character from *Parmelia.* But surely if *habit* should be considered together with the structure of the thallus or frond (and without it our arrangement of Cryptogamiæ, in particular, would be most incongruous), the greater number of the Acharian *Lecanoræ* with their crustaceous fronds and the almost leafy or coriaceous *Parmeliæ* ought to be separated. Still I must agree with that eminent Lichenist, that the limits of this, as of almost all the Genera of Lichens, are not easily defined. There are connecting links, and the place of such must perhaps ever remain doubtful.

* *Apothecia black or dark brown, sometimes pruinose.*

1. L. *átra, Ach.* (*black-shielded Lecanora*); crust subdeterminate rugged slightly cracked granulated and white, apothecia nearly flat deep-black the border elevated white at length notched and flexuose.—*Ach. Syn. p.* 146.—*Lichen ater, E. Bot. t.* 949.

Common on walls and rocks.

2. L. *argópholis,* Ach. (*white-scaled Lecanora*); crust smooth rugged and warted pale the warts at length imbricated some-

what lobed deformed, apothecia concave brownish-black the border rather acute coarctate crenulate. *Ach. Syn. p.* 147. *Grev. Fl. Edin. p.* 331.

On stones in walls, about Edinburgh, *Mr. Maughan* (*in Fl. Edin.*).

3. L. *exígua*, (*diminutive black-shielded Lecanora*); crust orbicular radiating thin leprous uneven dull ash-coloured, apothecia minute clustered full-black at length rather convex their border white at length brownish. *Sm.*—*Lichen exiguus, Ach. Prodr.*—*E. Bot. t.* 1849.—*Lecanora periclea*, β. *Ach. Syn. p.* 151.

On tiles and old pales.

4. L. *pericléa*, Ach. (*rough black-shielded Lecanora*); crust diffuse thin leprous very white, apothecia convex very black roughish with a white crenated at length powdery border. *Ach. Syn. p.* 250. (*a.*)—*Lichen pericleus, E. Bot. t.* 1850.

On old pales or posts, or the bark of fir, Hurst-pierpoint, Sussex, *Mr. Borrer*. Livermere, near Bury, *Rev. G. R. Leathes*.

5. L. *coarctáta*, Ach. (*contracted Lecanora*); crust spreading thin cracked unequal greyish, apothecia with the disk somewhat immersed at length elevated flat black the border elevated inflexed coarctate irregular pulverulent. *Ach. Syn. p.* 149.—*Lichen coarctatus, E. Bot. t.* 534.

On brick walls about Yarmouth, *Mr. D. Turner*.

6. L. *squamulósa*, (*scaly-crusted Lecanora*); crust imbricated cracked smooth brownish ash-coloured, its fragments angular and somewhat lobed, apothecia sunk at length elevated flattish of a brownish shining-black (with an elevated wavy border). *Sm.*—*Lichen squamulosus, E. Bot. t.* 2011.—*L. piceus, Dicks. Cr. Fasc.* 4. *p.* 22. *t.* 12. *f.* 5.—*Lecanora badia, Ach. Syn. p.* 154.?—*L. cervina, Ach. Syn. p.* 188.?

Rocks, North of England and Highlands of Scotland.—This has somewhat of the crust of a *Squamaria*, and hence it is probably *Lecanora cervina* of Ach., under which he quotes it: but it agrees equally well with that author's description of *L. badia*, and he gives, as a synonym to that species, the *Lichen piceus* of Dicks., which I presume, beyond all doubt, to be our plant.

7. L. *milvína*, Ach. (*wide-spreading Rock Lecanora*); crust tartareous thin even areolate grey or brown with a black filmy substratum, apothecia small nearly flat the border entire the disk dark-brown. *Borr.*—*Ach. Syn. p.* 151. (*a.*) *Borr. in E. Bot. Suppl. t.* 2662. *f.* 1.

On grey flinty slate-rock, Ireland, *Miss Hutchins*.—The *Lecanora milvina*, β. *Ach.* is the *Lecidea privigna* of this work, which was confounded in E. Bot. with *Lecidea simplex*. "It scarcely belongs to the present species, yet we are not prepared to say that it does not." *Borr.*

8. L. *aipóspila*, Ach. (*loose branchy-crusted Lecanora*); crust tartareous rugged with branch-like granulations brownish-grey

the edges plicate, apothecia small terminating the granulations the border entire at length depressed the disk dark brown. *Borr.* — *Ach. Syn. p.* 155. *Borr. in E. Bot. Suppl. t.* 2262. *f.* 2. — *Lichen aipospilus, Wahl. Lapp. p.* 409. *t.* 27. *f.* 2.

Rocks at Bamburgh, and Staples' islands, on the coast of Northumberland, *Mr. W. Robertson.* Maritime rocks, Orkney? *Mr. Borrer.* — "An extremely remarkable Lichen, a link, apparently, between the genera *Lecanora* and *Isidium*, approaching very closely to the latter in the structure of the *thallus*." *Borr.*

9. L. *spodophæ'a*, Ach. (*close branchy-clustered Lecanora*); crust tartareous areolate formed of concrete branch-like granulations grey greenish when wet, apothecia small terminating the granulations, the border slightly crenulate at length depressed the disk (dark) reddish-brown. *Borr.* — *Ach. Syn. p.* 155. *Borr. in E. Bot. Suppl. t.* 2662. *f.* 3. — *Lichen spodophæus, Wahl. Lapp. p.* 409.

Growing with *L. aipospila* on the coast of Northumberland, *Mr. W. Robertson.* — This species bears some general resemblance to *L. sophodes*; but its real structure, although more minute in all its parts, is most similar to that of *L. aipospila.*

10. L. *sophódes*, Ach. (*obscure black-shielded Lecanora*); crust orbicular granulated dull greenish ash-colour, apothecia slightly convex clustered black brown when moist with an elevated entire border. *Ach. Syn. p.* 153. — *Lichen sophodes, Ach. Prodr.* — *E. Bot. t.* 1791.

Common on trees, in Sussex, *Mr. Borrer.* About Yarmouth, *Mr. D. Turner.*

11. L. *tuberculósa*, Ach. (*warted fibrous-edged Lecanora*); crust greenish-grey formed of globular granulations with a radiated marginal fringe, apothecia sessile flattish glaucous-black with a thick elevated smooth border. *Sm.* — *Ach. Syn. p.* 164. — *Lichen tuberculosus, E. Bot. Suppl. t.* 1733.

Common on flint-stones, on the Sussex Downs, *Mr. Borrer.*

12. L. *aspérsa*, Borr. (*powdered warty Lecanora*); substratum of the crust filmy black, warts scattered tartareous slightly convex olive-green with pale green soredia, apothecia small elevated the margin thick inflexed the disk black. *Borr. in E. Bot. Suppl. t.* 2728.

On flints, near Bury St. Edmunds, *Rev. G. R. Leathes.* Abundant near Portslade, Sussex, *M. Borrer.* — Fruit rare. "This *Lichen* has been mistaken for *L. tuberculosa*, *E. Bot. t.* 1733.; but the warts of the thallus of that species are very prominent, even, and not powdery, and the substratum is of the same colour, not black: the *apothecia* also are more conspicuous and of a glaucous hue. In the black substratum, and in the dispersion of the warts, *L. aspersa* resembles *Lecidea atro-alba*, *E. Bot. t.* 2336., and *L. verruculosa*, *t.* 2317.; but, besides the generic characters, it differs from both in the colour of the warts, and in the powdery *soredia.* The *apothecia* are most like those of some imperfect states of *L. atra*, *t.* 949., but the structure of the thallus is very dissimilar." *Borr.*

13. L. *glaúcoma*, Ach. (*wall-eyed Lecanora*); crust tartareous black uneven hard greyish-white, apothecia depressed crowded at length tumid deformed black-brown or buff with a strong glaucous tinge and a wavy border. *Ach. Syn. p.* 165.—*Lichen glaucoma, E. Bot. t.* 2156.—*L. rupicola, Dicks.*—*L. varians, Dav. in Linn. Trans. v.* 2. *p.* 284. *t.* 28. *f.* 3.—"*L. compositus, With. Bot. Arr. v.* 4. *p.* 13. *t.* 31. *f.* 2, (*bad*)."

On whin-stone, or slate rocks, in mountainous countries.

14. L. *thelóstoma*, (*umbilicate-shielded Lecanora*); crust tartareous thin continued brown minutely cracked, apothecia sessile hemisphærical umbilicated reddish (-brown) with a thick elevated even border. *Sm.*—*Lichen thelostomus, E. Bot. t.* 2153.—*Verrucaria thelostoma*, "*Ach. in Winch, v.* 2. *p.* 44."—*Pyrenula umbonata, Ach. Syn. p.* 121.

Whin-stone rocks, near Eglestone, Durham, *Rev. Mr. Harriman.*—I agree with the opinion expressed by Sir James E. Smith, that this accords better with the *Lecanora* of Acharius than with the *Verrucariæ* or *Pyrenulæ.*

15. L. *subfúsca*, Ach. (*brown-shielded Lecanora*); crust thin continued smoothish brownish-white, apothecia sessile slightly convex dark reddish-brown sometimes inclining to black with a tumid entire border. *Ach. Syn. p.* 157.—*Lichen subfuscus, Linn.*—*E. Bot. t.* 2109.—*Dill. Musc. t.* 18. *f.* 16.

On the smooth bark of trees, most abundant; sometimes on rocks; and very variable in the size and hue of the *apothecia.* These are clustered, and, as it were, compound; sometimes the *crust* is greenish. *L. angulosa, Ach.* appears to be only a *var.* of this, found in the North of England and Scotland.

16. L. *frustulósa*, Ach. (*white-scaled Lecanora*); crust tartareous yellowish-white in dispersed tumid warts at length somewhat imbricated lobed and variously shaped, apothecia dark-brown at length convex with a crenate border.—*Ach. Syn. p.* 159.—*Lichen frustulosus, Dicks. Cr. Fasc.* 3. *p.* 13. *t.* 8. *f.* 10. *E. Bot. t.* 2273.

Rocks of micaceous schist, on the Breadalbane mountains.

** *Apothecia red or yellow, and sometimes inclining to brown, never black.*

17. L. *ventósa*, Ach. (*red-spangled Lecanora*); crust thick cracked the areolæ tumid greenish-sulphur-coloured sometimes whitish, apothecia appressed convex irregular blood-red rising above the narrow border. *Ach. Syn. p.* 159.—*Lichen ventosus, E. Bot. t.* 906.—*Dill. Musc. t.* 18. *f.* 14.

Mountain-rocks, abundant.

18. L. *cæsio-rúfa*, (*grey and red Lecanora*); crust limited granulated pale-grey, apothecia tawny-red flattish with a thick waved border. *Sm.*—*Lichen cæsio-rufus, Schrad.*—*E. Bot. t.* 1040.—*Lecanora rubricosa, Ach. Syn. p.* 162.

On walls, Norfolk and Cambridgeshire.

19. L. *rúbra*, Ach. (*red-shielded Elm Lecanora*); crust leprous white thin uneven continuous, apothecia numerous sessile concave brownish-salmon-colour (or red) with a thick elevated powdery crenate inflexed border. *Sm.*—*Ach. Syn. p.* 177.—*Lichen Ulmi, Sw.*—*E. Bot. t.* 2218.

On the bark of old Elms, Yorkshire, *Mr. Borrer.*

20. L. *Hæmatómma*, Ach. (*blood-specked Lecanora*); crust leproso-tartareous pulverulent white or pale sulphur-coloured with a fibrous border, apothecia imbedded scarlet concave, when old convex, the border thick white elevated remarkably inflexed mealy at length spreading.—*Ach. Syn. p.* 170.—*Lichen Hæmatomma, Ehrh.*—*E. Bot. t.* 486.—*Lichen coccineus, Dicks. Cr. Fasc.* 1. *p.* 8. *t.* 2. *f.* 1. *E. Bot. t.* 223.—*Lecanora Stonei, Ach. Syn. p.* 170.

Rocks and brick-walls, in various places. On Stonehenge, Wiltshire. Salisbury Craigs, Edinburgh. On the large Cross at Iona.—The *Lichen coccineus* of *E. Bot.* appears to be only an old state of the *L. Hæmatomma.*

21. L. *cerína*, Ach. (*waxy Lecanora*); crust somewhat granulated greyish-white, apothecia scattered elevated flat at length convex yellow waxy, the border inflexed somewhat pruinose.—*Ach. Syn. p.* 173.—*Lichen cerinus, Dicks, Cr. Fasc.* 3. *p.* 14. *E. Bot. t.* 627.

Trunks of trees, Norfolk and near London.

22. L. *crenuláta*, (*little crenated Lecanora*); crust scattered ash-coloured very thin, apothecia minute dispersed brownish-grey with an elevated crenated whitish margin. *Sm.*—*Lichen crenulatus, Dicks. Cr. Fasc.* 3. *p.* 14. *t.* 9. *f.* 1.—*Lichen dispersus, Ach. Prodr.* (*Sm.*)—*Lecanora galactina*, β. *Ach. Syn. p.* 187.

Limestone rocks, South of England.

23. L. *byssína*, (*mealy-bordered Lecanora*); crust powdery brownish, apothecia flat dull yellow with a very white mealy elevated border (when old double). *Sm.*—*Lichen byssinus, Dicks. Cr. Fasc.* 2. *p.* 19. *E. Bot. t.* 432.

On trees and stones, Scotland, *Mr. Dickson.* On brick, near London, *Sm.*—This and the preceding are, to me, very obscure plants. Acharius seems inclined to refer the present to *L. cerina*, but the figure is very unlike that species.

24. L. *chloroleúca*, Ach. (*green and white Lecanora*); crust white leprous very thin, apothecia crowded elevated flat olive-green the border white undulated. *Sm.*—*Ach. Syn. p.* 160.—*Lichen chloroleucus, E. Bot. t.* 1373.

On mosses, in alpine countries.

25. L. *vária*, Ach. (*variable-shielded Lecanora*); crust thin granulated scattered pale yellowish-green, apothecia crowded flattish buff or brown the border waved irregular inflexed. *Sm.*—*Ach. Syn. p.* 161.—*Lichen varius, Ach. Prodr.*—*Dicks. E. Bot. t.* 1666.

On old posts and pales. On rocks, Appin, *Capt. Carmichael.*

26. L. *albélla*, Ach. (*cream-coloured Lecanora*); crust leprous thin continued cream-coloured somewhat polished, apothecia sessile whitish-buff uneven with a thin white wavy border. *Sm.* —*Ach. Syn. p.* 168.—*Lichen albellus, Pers.*—*E. Bot. t.* 2154.

Common on the smooth bark of trees.

27. L. *carneo-lútea*, Ach. (*pale crack-shielded Lecanora*); crust membranous extremely thin indeterminate white smooth, apothecia depressed minute flattish flesh-coloured when young covered by the white border which cracks in the centre. *Sm.*—*Ach. Syn. p.* 171. *Parmelia carneo-lutea, Turn. in Linn. Trans. v.* 9. *p.* 145. *t.* 12. *f.* 2.—*Lichen carneo-luteus, E. Bot. t.* 2010.

Trunks of elms, Sussex and the Isle of Wight, *Mr. Borrer.*

28. L. *Parélla*, Ach. (*Crab's-eye Lecanora or Perelle*); crust dirty-white determinate plicato-verrucose, apothecia scattered thick the disk concave of the same colour as the thick tumid even border.—*Ach. Syn. p.* 169.—*Lichen Parellus, Linn.*—*E. Bot. t.* 727.—*Dill. Musc. t.* 18. *f.* 10.

Rocks, principally in mountainous countries, frequent.—This is the *Perelle* of Auvergne and other parts of France, where it is extensively employed to produce a dye, far superior to that of the *Cudbear* (*Lecanora tartarea*), and quite equal to that of the *Archill* (*Roccella tinctoria*).

29. L. *tartárea*, Ach. (*tartareous Lecanora, or Cudbear*); crust thick granulated and tartareous greyish-white, apothecia scattered the disk convex at length plane or tumid yellow-brown inclining to flesh-colour the border thick inflexed at length wavy.—*Ach. Syn. p.* 172.—*Lichen tartareus, Linn.*—*E. Bot. t.* 156.—*Dill. Musc. t.* 18. *f.* 13.—*β. Upsaliensis;* crust thinner enveloping the stems and leaves of mosses and other plants, hence branched and throwing out branched bristles.—*Lecanora tartarea, γ. frigida, Ach. Syn. p.* 172.—*Lichen Upsaliensis, Linn.*—*E. Bot. t.* 1634.—*Lichen frigidus, Sw.*—*E. Bot. t.* 1879.

On rocks in alpine countries, abundant. *β.* enveloping the branches and leaves of mosses, heath, &c.—This is the famous *Cudbear* (so called after a Mr. Cuthbert, who first brought it into use) employed to produce a purple for dyeing woollen yarn; and nowhere, perhaps, used to so great an extent as in the manufactory of Mr. Mackintosh of Glasgow. This gentleman imports it largely from Norway, where it grows more abundantly than with us; yet in the Highland districts many an industrious peasant gets a living by scraping off this Lichen with an iron hoop, and sending it to the Glasgow market. When I was in the neighbourhood of Fort Augustus, some years ago, I was informed that a person could earn 14*s.* per week at this work, selling the material at 3*s.* 4*d.* the stone of 22 lbs. The fructified specimens are reckoned the best.

A remarkable and fructified state of this plant, as it appears to me, is imported by Mr. Mackintosh from Sicily, with the *crust* singularly thick and formed into warts so exceedingly elongated and cylindrical that they appear like the *podetia* of an *Isidium*.

30. L. *Turnéri*, Ach. (*mealy flesh-coloured Lecanora*); crust leprous very mealy greenish-white, apothecia flesh-coloured

powdery with a very thick rounded entire mealy border. *Ach. Syn. p.* 170.—*Lichen Turneri, E. Bot. t.* 857.

Trunks of old oaks and other trees.—Too near perhaps to *L. tartarea.*

31. L. *citrína*, Ach. (*lemon-coloured Wall Lecanora*); crust leprous powdery indeterminate bright lemon-coloured, apothecia scattered sessile minute orange-coloured with a pale yellow powdery border. *Sm.*—*Ach. Syn. p.* 176.—*Lichen citrinus, Ach. Prodr.*—*E. Bot. t.* 1793.

On brick and flint walls in Norfolk. On wood, Yorkshire.

32. L. *vitellína*, Ach. (*yolk of Egg Lecanora*); crust leprous granulated indeterminate bright greenish-yellow, apothecia clustered sessile flat tawny-yellow at length convex and brownish the border elevated crenate. *Sm.*—*Ach. Syn. p.* 174.—*Lichen vitellinus, Ehrh.*—*E. Bot. t.* 1792.

Common on garden-pales, rails, deal boards, &c.

II. *Thallus subfoliaceous, consisting of scales attached to the substance on which they grow and more or less combined. Apothecia always bordered and discoid, sessile* (*patellulæ*).

Fam. VIII. Squamarieæ.

15. Psóra. *Hoffm.* Psora.

Thallus defined, thick, formed of distinct, flattish or convex *tubercles* or scales. *Apothecia* (*patellulæ*) bordered, plane, at length convex, placed at the sides of the scales, the *border* of the same colour and substance as the disk.—Name; ψωρα, *a scurf.*

1. P. *cæruleo-nígricans*, (*black and blue Psora*); thallus of irregular imbricated tumid powdery greyish warts or scales, apothecia black irregular flattish from the margin of the scales at length hemisphærical.—*Lichen cæruleo-nigricans, Lightf.*—*E. Bot. t.* 1139.—*Lecidea vesicularis, Ach. Syn. p.* 51.—*Psora vesicularis and paradoxa, Hoffm.*

Upon the ground and among rocks.

2. P. *atro-rúfa*, (*red-brown Psora*); thallus subcontinuous lobed, the lobes angular smooth imbricated grey-brown, apothecia sessile dark red-brown with a narrow border at length confluent.—*Lecidea atro-rufa, Ach. Syn. p.* 51. *Lichen atro-rufus, Dicks. Cr. Fasc.* 4. *p.* 2. *t.* 12. *f.* 4. *E. Bot. t.* 1102.

On sandy ground, among Mosses, chiefly in the north of England.

3. P. *scaláris*, (*olive and black imbricated Psora*); thallus imbricated often scattered in kidney-shaped lobes or scales ascending distinct pale-olive powdery at the edge and black, apothecia flat irregular black-bordered. *Sm.*—*Lecidea scalaris, Ach. Syn. p.* 52.—*Lichen scalaris, Ach. Prodr.*—*E. Bot. t.* 1501.—*L. leucophæus, Dicks.*—*Psora ostreata, Hoffm.*

Old pales and in the inside of old hollow trees, Suffolk, &c. On trees and rocks, Scotland, *Mr. Dickson.*

4. P. *decípiens*, Hoffm. (*deceitful Psora*); thallus subimbricated with separate roundish rather broader concave lobes or scales flesh-coloured or red white at the margin at length brown, apothecia small marginal convex or subglobose, the border obsolete.—*Lecidea decipiens, Ach. Syn. p.* 52.—*Lichen decipiens, Hedw.*—*E. Bot. t.* 870.

On the Gogmagog hills, Cambridgeshire. Mountains of Scotland, frequent among rocks.

5. P. *glebulósa*, (*broken-crusted brown-shielded Psora*); thallus distinct imbricated with minutely lobed glaucous-white tumid adherent scales, apothecia convex deep red-brown with a thin entire border.—*Lichen glebulosus, E. Bot. t.* 1955.—*L. testaceus,* "*Winch, Guid. v.* 2. *p.* 42."—*Lecidea pholidiota, Ach. Syn. p.* 53.

On quartzose rocks at Lanchester, and walls at Knitsby, Durham, *Mr. Winch.*

6. P.? *rubifórmis*, (*Raspberry-fruited Psora*); thallus depressed of somewhat crustaceous rounded lobed crenate light-green lobes or scales thickened and pale at their margins white beneath, apothecia on the disk clustered sessile minute globose hollow red. *Sm.*—*Lichen rubiformis, Wahl.*—*E. Bot. t.* 2112.—*Bæomyces rubiformis, Ach. Meth. p.* 324. *t.* 7. *f.* 5.—*Cenomyce rubif., Lich. Univ.*—*Lecidea rubiformis, Ach. Syn. p.* 52.

On turfy earth near Ripon, Yorkshire, *Mr. W. Brunton.*—This singular production I know only from figures and description. The *fronds* resemble the crust of some *Scyphophorus:* the *fruit* is like nothing among any Genus of *Lichens.*

16. SQUAMÁRIA. (Squamaria *and part of* Placodium, *De Cand.*) Squamaria.

Thallus defined, scaly, spreading, orbicular and stellate, the scales distinct or adherent, often imbricated, diverging. *Apothecia* (*patellulæ*) bordered, sessile, the *border* of the same substance as the *thallus.*—Named from *squama*, a *scale*, the thallus of several species being formed of scales more or less combined.—This may be considered an intermediate link between the *Lecanoræ* and the *Parmeliæ;* most allied, however, to the latter, but having a much less distinctly leafy or membranaceous thallus.

* *Thallus imbricated.*

1. S. *crássa*, De Cand. (*thick Squamaria*); thallus imbricated thick cartilaginous greyish-green its lobes or scales spreading imbricated lobed and waved brownish beneath, apothecia flattish brownish-orange with an elevated border.—*Lecanora crassa, Ach. Syn. p.* 190.—*Lichen crassus, Huds.*—*E. Bot. t.* 1893.—*Lichen cartilagineus, Lightf.*—*Dicks.*—*Dill. Musc. t.* 24. *f.* 74.

On limestone rocks.

2. S. *muscórum*, (*little fleshy-shielded Moss Squamaria*); thallus imbricated flat pale-brown inclining to flesh-colour the margin mealy and bluish dilated lobed and crenated, apothecia prominent thick orange-coloured with a slightly raised border. —*Lecanora crassa, Ach. Syn. p.* 193.—*L. hypnorum, Ach. Lich. Univ.*—*Lichen carnosus, Dicks. Cr. Fasc.* 2. *p.* 21. *t.* 6. *f.* 7. *E. Bot. t.* 1684.

On mosses, among rocks and upon trees in mountainous countries, not unfrequent.

3. S. *hypnórum*, (*spreading Ground Squamaria*); thallus spreading of small greenish-brown scales rounded crenulated and somewhat granulated at the margin, apothecia at length flat red-brown with a thin inflexed pale lobed or crenated border.—*Lecanora hypn., Ach. Syn. p.* 193.—*Lichen hypnorum, Fl. Dan. t.* 956. *Dicks. Cr. Fasc.* 3. *p.* 14. *E. Bot. t.* 740.

On the ground, among mosses, in barren soil. — The small, almost granulated portions of the *thallus* of this plant render it doubtful whether it should not still rank with the true *Lecanoræ*.

4. S. *tribácia*, (*crenated Squamaria*); thallus of whitish scales the lobes irregular eroso-crenulate imbricated beneath of the same colour and subfibrillose, apothecia appressed flat pale at length notched and lobed in the circumference the border raised persistent.—*Lecanora tribacia, Ach. Syn. p.* 191.

Trees; England, (*Ach.*).—Connel Ferry, Scotland, by the south Ferry-House, *Borr. and Hooker.*

5. S. *leucolépis*, (*greyish-lobed Squamaria*); thallus imbricated the segments bluntly lobed and notched somewhat radiate at the margin leaden-grey black and somewhat fibrillose beneath, apothecia black with an elevated thick crenated border. —*Lichen leucolepis, Wahl. Lapp. p.* 781.—*Lecanora leucol. Ach. Syn. p.* 194.—*Lichen Hookeri, E. Bot. t.* 2283.

Rare. On the micaceous rocks of the Breadalbane mountains, *Borr. and Hooker.*—In Norway, this seems to grow upon decayed mosses; with us, always on rocks of micaceous schist.

6. S. *candelária*, (*yellow Candle Squamaria*); thallus crowded the segments upright entangled yellow minutely lobed jagged and divaricated, apothecia minute flat deep-yellow with a thick inflexed border. *Sm.*—*Lecanora candelaria, Ach. Syn. p.* 191. —*Lichen candelarius, Linn.*—*E. Bot. t.* 1794.—*β. polycarpa*; thallus spreading crustaceous wrinkled greyish-yellow lobed and toothed, apothecia very numerous crowded flat orange with a thick inflexed border. *Sm.*—*Lecanora candelaria, β. Ach. Syn. p.* 192.—*Lichen polycarpus, Ehrh.*—*E. Bot. t.* 1795.

Posts, rails and rocks, frequent. — In Sweden, this Lichen is said to be used for staining candles yellow, at festivals, whence its specific name.

** *Thallus adnate, radiant, stellate and lobed in the circumference.*

7. S. *murórum*, (*yellow wall Squamaria*); thallus orbicular cracked plaited and lobed adnate bright-yellow the segments

linear, apothecia central crowded sessile flattish orange-coloured with a slightly waved border.—*Lecanora murorum, Ach. Syn. p.* 181.—*Lichen murorum, Ach. Prodr.*—*E. Bot. t.* 2157.—*Dill. Musc. t.* 17. *f.* 3.

On rocks, stones and walls, frequent.

8. S. *miniáta*, (*vermillion-coloured Squamaria*); thallus subgranulated deep-red smooth above the circumference lobed and radiated, the segments convex very short inciso-crenate, apothecia minute turgid, the disk plane at length hemisphærical, the border entire and of the same colour.—*Lecanora miniata, Ach. Syn. p.* 182. *Winch, Fl. of North. and Durh. p.* 88.—*Lobaria miniata, Hoffm.*

On Gainsford Church, Durham, *Rev. J. Harriman.* (*Winch.*)

9. S. *élegans*, (*elegant orange Squamaria*); thallus hard smooth orbicular adnate plaited or rugged deep-orange its lobes linear compound convex wavy, apothecia concave central of the same colour with the crust, the border somewhat inflexed entire.—*Lecanora elegans, Ach. Syn. p.* 182.—*Lichen elegans, E. Bot. t.* 2181.

On rocks, North of England and Scotland.

10. S. *fúlgens*, (*yellow Ground Squamaria*); thallus orbicular adnate lobed and waved somewhat imbricated lemon-coloured whitish when dry, apothecia deep-orange at length convex their border elevated at length obliterated.—*Lecanora fulgens, Ach. Syn. p.* 183.—*Lichen fulgens, Ach. Prodr.*—*E. Bot. t.* 1667.—*L. citrinus, Hedw.*

On rocks, slightly covered with earth, rare. Near Stackpole-court, Pembrokeshire, *Mr. Adams.* Sussex and Isle of Wight, *Turn. and Borrer.*

11. S. *lentígera*, De Cand. (*white Ground Squamaria*); thallus orbicular adnate lobed scarcely imbricated greenish-white the lobes broad slightly concave waved and crenated, apothecia nearly flat reddish buff-colour with the border elevated tumid inflexed subcrenulate.—*Lecanora lentigera, Ach. Syn. p.* 179.—*Lichen lentigerus, Web.*—*E. Bot. t.* 871.

On dry, chalky heaths; Cambridgeshire and Suffolk.

12. S. *cándicans*, (*whitish radiating Squamaria*); thallus tartareous thin adnate orbicular plaited lobed and radiating in the margin bright greyish-white, apothecia clustered greyish-black slightly convex with a plaited elevated border.—*Lichen candicans, Dicks. Cr. Fasc.* 3. *p.* 15. *t.* 9. *f.* 5. *E. Bot. t.* 1778.—*Lecanora epigea, Ach. Syn. p.* 179.

On limestone rocks in England. On chalk at Beachy-head, Sussex, *Mr. Borrer.*

13. S. *gélida*, Delise, (*flesh-coloured alpine Squamaria*); thallus orbicular adnate radiated lobed and laciniated dirty-white smooth with large brownish central radiated fleshy warts,

apothecia concave rose-coloured with a thick elevated entire border. — *Lecanora gelida, Ach. Syn. p.* 186. — *Lichen gelidus, Linn.* — *Dicks.* — *E. Bot. t.* 699.

On rocks in the north of England, particularly in Teesdale, and Highlands of Scotland.

14. S. *lanuginósa*, (*powdery Squamaria*); thallus orbicular yellowish-white pulverulent greyish-black and downy beneath lobes imbricated plane rounded slightly crenated, apothecia reddish (of the same colour as the crust, *Dicks.*) their border pulverulent. — *Parmelia lanuginosa, Ach. Syn. p.* 201. *Hook. Fl. Scot. P. II. p.* 53. — *Lichen membranaceus, Dicks. Cr. Fasc.* 2. *p.* 21. *t.* 6. *f.* 1.

On rocks, in the Highlands of Scotland; not very uncommon. Appin, *Capt. Carmichael.*

15. S. *Cleménti*, (*Clementine Squamaria*); thallus adnate very mealy with a membranous radiating lobed and finely cut margin of a whitish unchangeable grey, apothecia bluish-black with an inflexed crenate border. *Sm.* — *Parmelia Clementi, Turn. in Linn. Trans. v.* 9. *p.* 146. *t.* 13. *f.* 1. — *P. Clementiana, Ach. Syn. p.* 201. — *Lichen Clementi, E. Bot. t.* 1779.

On trees and tiled roofs in Sussex, as well as about Tunbridge Wells and Southampton, *Mr. Borrer.*

16. S. *cæsia*, (*grey-warted Squamaria*); thallus orbicular convex lobed and imbricated greyish-white its segments unequally notched bearing powdery grey warts in the centre, apothecia small glaucous-black concave with an elevated rather thick inflexed border. — *Psora cæsia, Hoffm.* — *Parmelia cæsia, Ach. Syn. p.* 216. — *Lichen cæsius, Ach. Prodr.* — *E. Bot. t.* 1052.

On walls, stones, and roofs of houses, in England.

17. S. *affinis*, (*spongy Squamaria*); thallus orbicular livid lead-colour with broad notched and cut lobes which are imbricated beneath somewhat spongy with bluish-black dense fibres, apothecia rusty-coloured nearly flat with a thick elevated inflexed crenated border. — *Lichen affinis, Dicks. Cr. Fasc.* 4. *p.* 24. *t.* 12. *f.* 6. *E. Bot. t.* 983. — *Parmelia rubiginosa, Ach. Syn. p.* 201. — *Lichen rubiginosus, Thunb. Fl. Cap. p.* 176.?

On trees, in subalpine countries, frequent. — I have retained Mr. Dickson's name, in preference to that of Thunberg, to which Acharius refers it, under an idea that the African and European plant may prove different. The species was called *affinis*, on account of its similarity with *Lichen* (our *Placodium*) *plumbeus:* but however great the resemblance may be in the *thallus*, their *apothecia* are quite different.

18. S. *circináta*, (*circinate Squamaria*); thallus adnate subcrustaceous in the centre orbicular greyish cracked marked with radiant marginal lobe-like furrows, apothecia central crowded depressed blackish-brown at length angular with a smooth border. — *Lecanora circinata, Ach. Syn. p.* 184. — *Lichen circinatus, Ach. Prodr.* — *E. Bot. t.* 1941.

On flat calcareous stones, Suffolk, Cambridge and Westmoreland. On encrinal limestone rocks, near the new bridge below Barnard-Castle, Durham, *Mr. Winch.* Scotland.

19. S. *saxícola*, (*radiated wall Squamaria*); thallus orbicular finely lobed somewhat imbricated pale sulphureous-green, the lobes cut crenate zigzag and entangled, apothecia central crowded flattish tawny-brown with a pale uneven border. — *Lecanora saxicola, Ach. Syn. p.* 180. — *Lichen saxic., Ach. Prodr. — E. Bot. t.* 1695. — *L. muralis, Dicks.* — *Psora muralis, Hoffm.*

On rocks, brick-walls and loose flinty stones, in exposed situations.

20. S. *elæína*, (*orbicular olive Squamaria*); thallus orbicular imbricated depressed stellated membranous dark greenish-olive smoothish and of the same colour beneath its segments close-pressed pinnatifid linear obtuse, apothecia central brownish-black with an elevated border. — *Parmelia elæina, Wahl. — Ach. Syn. p.* 200. — *Lecanora elæina, Ach. Lich. Univ.* — *Lichen elæinus, Wahl. Lapp. p.* 425. *t.* 28. *f.* 3. *E. Bot. t.* 2158.

Not rare, on the bark of Elms and Fruit-trees, sometimes on flint walls, Sussex, *Mr. Borrer.* On walls and trees, about Norwich, *Sir J. E. Smith.*

17. Placódium, *Fée*, (*part of* Placodium, *De Cand.*). Placodium.

Thallus defined, orbicular and stellated, the scales adherent, indistinct, pulverulent, foliaceous in the circumference. *Apothecia* (*patellulæ*) usually in the centre of the thallus, bordered, the border of the same colour as the disk. — Named from πλαξ, πλακος, a *crust* or *leaf*. — The species of this genus do not rank well with *Psora*, whose thallus is formed of distinct or very slightly combined scales or tubercles, nor yet with *Lecidea*, whose crust is still more different. They have indeed the fructification of *Lecidea* with the thallus of *Squamaria*, or in 1 species (*P. dædaleum*) almost that of *Parmelia*.

1. P. *canéscens*, De Cand. (*grey Tree Placodium*); thallus adnate orbicular often confluent plaited and lobed at the margin with powdery spots of a glaucous-white in the centre, apothecia central depressed black with a narrow border. — *Lecidea canescens, Ach. Syn. p.* 54. — *Lichen canescens, Dicks. Cr. Fasc.* 1. *p.* 10. *t.* 2. *f.* 5. *Dill. Musc. t.* 18. *f.* 17. A.

On trees in England, more rarely on rocks, on walls and roofs, and rarely producing *apothecia*.

2. P. *plúmbeum*, (*lead-coloured spongy Placodium*); thallus orbicular livid lead-colour broadly lobed and notched and somewhat imbricated at the margin thick often covered in the centre with grey granulations, clothed beneath with bluish-black spongy fibres, apothecia central small flat rust-coloured with a very obscure border. — *Parmelia plumbea, Ach. Syn. p.* 202. — *Lichen plumbeus, Lightf. Scot. p.* 826. *t.* 26. *f.* 2. *E. Bot. t.* 353. — *Lichen cærulescens, Dicks.*

On trees, in mountainous countries; especially near the sea and near lakes.

3. P. *microphýllum*, (*small-leaved Cushion Placodium*); thallus slightly imbricated depressed fragmentary on a dense black fibrous cushion, its segments grey lobed crenated and granulated at the edge, apothecia tawny with a paler smooth border. *Sm.* — *Lichen microphyllus, Schrad.* — *E. Bot. t.* 2128. — *Lecidea microphylla, var. triptophylla, Ach. Syn. p.* 53.

On trees, Bodmin, *Mr. D. Turner.* Loch Katrine and other places in the Highlands of Scotland.

4. P. *dædaléum*, (*fine-lobed imbricated Placodium*); thallus closely imbricated radiated membranous very smooth brownish-grey pale with black fibres beneath its segments linear obtuse undulated, apothecia black with a black border of their own substance. *Sm.* — *Lichen dædaleus, E. Bot. t.* 2129.

Scotland, on rocks? *Mr. Menzies.* (*E. Bot.*)

III. *Thallus loose, scarcely attached, except by fibres or radicles or a small base, to the substance on which it grows.*

A. *Upper surface different from the under.*

a. *Attachment of the thallus diffuse* (*not fixed by a central point.*)

α. Apothecia scutelliform, discoid, bordered, attached by the centre.

* *Thallus more or less membranaceous.*

FAM. IX. PARMELIACEÆ.

18. PARMÉLIA. *Ach.* Parmelia.

Thallus foliaceous, membranaceous or coriaceous, spreading, lobed and stellated or laciniated, more or less fibrous beneath. *Apothecia* (*scutellæ*) orbicular, beneath formed of the *thallus*, free, fixed only by a central point, the *disk* concave, coloured, the *border* formed by the inflexed *thallus*.—Named from παρμη, a *small shield*, and ειλεω, to *surround or enclose*; in allusion to the apothecia being surrounded by a border of the crust.

* *Thallus with its segments not inflated at the extremity.*

1. P. *glomulífera*, Ach. (*glomuliferous Parmelia*); thallus sub-cartilaginous orbicular glaucous-grey broadly and irregularly lobed and sinuated, bearing large and tufted warts and excrescences of a dark greenish-brown colour, beneath tawny and downy, apothecia red-brown with an elevated border. — *Ach. Syn. p.* 195. — *Lichen glomuliferus, Lightf.* — *E. Bot. t.* 293.

Trunks of old trees, in mountainous countries.

2. P. *caperáta*, Ach. (*wrinkled sulphur Parmelia*); thallus sub-membranaceous orbicular pale sulphur-colour lobed sinuated and crenate granulose in the centre black and hispid beneath, apothecia scattered bright chestnut with an elevated incurved border. *Ach. Syn. p.* 196.

Trunks of trees, rocks and old pales, frequent in mountainous countries. — This and the preceding are among the largest and handsomest of the British *Lichens.*

3. P. *conspérsa,* Ach. (*greenish Chestnut-shielded Parmelia*); thallus orbicular membranous lobed and sinuated pale greenish-yellow with scattered dark points granulated in the centre, beneath brown with black fibres, apothecia near the centre dark chestnut-brown with an inflexed boder. — *Ach. Syn. p.* 209. — *Lichen conspersus, Ach.*

On rocks and stones in mountainous countries.

4. P. *scórtea,* Ach. (*leathery granular Parmelia*); thallus orbicular submembranaceous lobed and sinuated greyish-white with innumerable dark granulations black and rough beneath, apothecia bright chestnut with an inflexed crenated border. — *Ach. Syn. p.* 197. — *Lichen scorteus, Ach. Prodr.* — *E. Bot. t.* 2065.

On trees and pales, in Surrey and Sussex, *Mr. Borrer;* and in other places; but always barren.

5. P. *Borréri,* Turn. (*Borrerian Parmelia*); thallus orbicular submembranaceous broadly lobed and sinuated tawny-grey sprinkled with white powdery warts brown and somewhat fibrous beneath, apothecia bright chestnut with an elevated inflexed border. — *Turn. in Linn. Trans. v.* 9. *p.* 148. *t.* 13. *f.* 2. *Ach. Syn. p.* 197. — *Lichen Turneri, E. Bot. t.* 1780.

Trunks of trees, especially fruit-trees, and on stones in Sussex. Norfolk. On a wall at Luss, Scotland; and elsewhere. — Distinguished from the following more abundant species, by its less deeply divided and broader lobed *thallus,* of a yellower green colour, in the absence of elevated reticulated powdery veins and pits, in the presence of white powdery *warts,* and in the paler and less fibrous underside. Its *fructification* is very rare.

6. P. *saxátilis,* Ach. (*grey Stone Parmelia*); thallus orbicular grey deeply lobed and sinuated imbricated with retuse segments, the upper side rough with pits and raised reticulated powdery lines, black and shaggy beneath, apothecia dark-brown with an inflexed crenated border. — *Ach. Syn. p.* 203. — *Lichen saxatilis, Linn.* — *E. Bot. t.* 603. — *Dill. Musc. t.* 24. *f.* 83.

Very frequent upon trees, rocks and stones, especially in mountainous countries. — In Scotland it is collected abundantly by the peasantry and used, with the following species, to dye woollen stuffs of a dirty purple.

7. P. *omphalódes,* Ach. (*purple Rock Parmelia*); thallus orbicular dark purplish-brown shining with pale zigzag cracks much lobed and multifid imbricated the segments truncated black and shaggy beneath, apothecia dark-brown with an inflexed crenated border. — *Ach. Syn. p.* 203. — *Lichen omphalodes, Linn.* — *E. Bot. t.* 604. — *Dill. Musc. t.* 24. *f.* 80.

On rocks and stones; most abundant on exposed moors. — This and

the preceding species are liable to be infested with a parasite, which has been called *Endocarpon parasiticum* Ach. (*E. Bot. t.* 1866.)

8. P. *perforáta*, Ach. (*perforate-shielded Parmelia*); thallus orbicular somewhat membranous glaucous-green naked deeply lobed crenate and sinuated fringed with black hairs at the margin black and rough beneath, apothecia red-brown at length perforated deep and concave with an entire narrow border.—*Ach. Syn. p.* 198.—*Lichen perforatus, Ach. Prodr.*—*E. Bot. t.* 2423.—*Dill. Musc. t.* 20. *f.* 42, 43 *and* 44., *and t.* 82. *f.* 3.

On rocks and old trees, Wales, *Sir J. E. Smith.* Sussex, not unfrequent, *Mr. Borrer.*—The *fructification* has never been found in Britain. In America and other countries this plant is abundant, and I have lately received copious specimens with their curious *apothecia*, gathered by Mr. Drummond on the Missouri.

9. P. *perláta*, Ach. (*pearly Parmelia*); thallus orbicular glaucous with rounded sinuated and crenate flattish lobes often bordered with powdery tubercles black and hairy beneath, apothecia elevated olive-coloured concave with a crenate thin powdery inflexed border.—*Ach. Syn. p.* 197.—*Lichen perlatus, Linn.*—*E. Bot. t.* 341.—*Dill. Musc. t.* 30. *f.* 39.

Trunks of old trees and pales, not unfrequent, but very rare in fructification.—Sir J. E. Smith has translated *perlatus* by *pearly;* but the word was probably intended to imply its wide-spreading habit.

10. P. *lævigáta*, Ach. (*even grey Parmelia*); thallus spreading greyish-white smooth deeply cut into many multifid lobes and segments the ultimate ones broadly linear acute with terminal powdery warts black and shaggy beneath, apothecia very concave deep chestnut with an entire inflexed border.—*Ach. Syn. p.* 212.—*Lichen lævigatus, E. Bot. t.* 1852.

On rocks, Anglesea and Caernarvonshire, *Rev. H. Davies.*

11. P. *herbácea*, Ach. (*bright-green Parmelia*); thallus orbicular membranaceous bright-green and naked above when moist (whitish-brown when dry) lobed and crenated at the margin whitish-downy and fibrous beneath, apothecia orange-brown nearly flat with an inflexed border.—*Ach. Syn. p.* 298.—*Lichen lætevirens, Lightf.*—*Dicks. E. Bot. t.* 294.

On the trunks of trees, decayed wood, rocks and mosses, in mountainous countries.—A large and very handsome species, often forming broad conspicuous patches on the trunks of trees in moist subalpine regions.

12. P. *tiliácea*, Ach. (*smooth grey Parmelia*); thallus orbicular membranaceous pale glaucous-grey subpruinose lobed and sinuated crenate shaggy and brownish-black beneath, apothecia brown with an incurved entire or crenate border.—*Ach. Syn. p.* 299.—*Lichen tiliaceus, Hoffm.*—*E. Bot. t.* 700.

On trees, in the south of England. On rocks, Anglesea and Caernarvonshire, *Rev. H. Davies.* Upon the battlements of Brodick Castle, Isle of Arran.

13. P. *olivácea*, Ach. (*olive-coloured Parmelia*); thallus orbicu-

lar olive-brown rugged in the centre and often granulated the margin lobed and crenated appressed brownish and fibrous beneath, apothecia brown concave with an inflexed crenated border. —*Ach. Syn. p.* 200.—*Lichen olivaceus, Linn.*—*E. Bot. t.* 2180. *Dill. Musc. t.* 24. *f.* 77, 78.

On the bark of trees, park-pales, &c. frequent.

14. P. *corrugáta*, Ach. (*wrinkle-shielded Parmelia*); thallus orbicular membranaceous somewhat rugged of a dark glaucous-green lobed cut and rounded imbricated waved blackish and fibrous beneath, apothecia large concave red-brown externally wrinkled with a crenate inflexed border.—*Ach. Syn. p.* 199. —*Lichen corrugatus, Sm. in Linn. Trans. v.* 1. *p.* 83. *E. Bot. t.* 1652.—*Dill. Musc. t.* 24. *f.* 79.

Saham wood, Norfolk, *Sir J. E. Smith.* Trunks of old Thorns, Ickworth Park, near Bury, Suffolk, *Rev. G. R. Leathes.*—The large, rugged, concave *apothecia* and larger wavy *thallus* distinguish this species from *P. olivacea*, with which it has sometimes, but most incorrectly, been confounded.

15. P. *pulverulénta*, Ach. (*green powdery Parmelia*); thallus orbicular stellated deep glaucous-green hoary ash-coloured when dry cut into numerous oblong multifid flat and obtuse wrinkled segments black and downy beneath, apothecia glaucous-black with a thick inflexed at length leafy border.—*Ach. Syn. p.* 214. —*Lichen pulverulentus, Schreb.*—*E. Bot. t.* 2063.—*Dill. Musc. t.* 24. *f.* 71.

Very common on the trunks of trees.

16. P. *pitýrea*, Ach. (*scurfy imbricated Parmelia*); thallus orbicular imbricated glaucous-green hoary ash-coloured when dry its segments dilated concave rounded crenate very powdery at their lateral margins pale and fibrous beneath, apothecia glaucous-black with a broad inflexed very powdery border. *Sm.*—*Ach. Syn. p.* 201.—*Lichen pityreus, Ach. Prodr.*—*E. Bot. t.* 2064.—*L. pulverulentus, Ehrh.*—*L. lanuginosus, Hoffm. Enum.*

Trees and walls, in Norfolk and Suffolk, common. About Glasgow, *Dr. Scouler.*

17. P. *stelláris*, Ach. (*black-shielded stellated Parmelia*); thallus orbicular stellated pale unchangeable grey the segments linear rather convex multifid beneath whitish with dark fibres, apothecia greyish-black with an entire elevated at length inflexed border.—*Ach. Syn. p.* 216.—*Lichen stellaris, Linn.*—*E. Bot. t.* 1697.—*Dill. Musc. t.* 24. *f.* 70.

Frequent on the bark of trees.

18. P. *speciósa*, Ach. (*elegant garland Parmelia*); thallus stellated imbricated somewhat cartilaginous greenish-white cut into numerous linear multifid segments powdery at the extremities and obtuse beneath snow-white with grey fibres, apothecia brown

with an inflexed notched or leafy border.—*Ach. Syn. p.* 221.—*Lichen speciosus, Wulf.*—*E. Bot. t.* 1979.

Upon rocks among mosses, at Ballacheulish, Scotland, *Turner* and *Hooker.*—The *fructification* has not been found in Great Britain, but is described from specimens, gathered in N. America.

19. P. *cyclóselis*, Ach. (*orbicular dusky Parmelia*); thallus orbicular stellated glaucous brownish-green, cut into many imbricated nearly flat multifid retuse segments bearing white mealy warts, beneath and at the margin black and fibrous, apothecia brownish-black with an inflexed entire border.—*Ach. Syn. p.* 216.—*Lichen cycloselis, Ach. Prodr.*—*E. Bot. t.* 1942.

On trees and old pales, in England.—Walls and stones at Appin, Argyleshire, *Capt. Carmichael.*

20. P. *virélla*, Ach. Meth. (*little green imbricated Parmelia*); thallus membranaceous stellated greyish-green the segments flat short lobed obtuse laciniated black and spongy beneath sprinkled above with powdery warts and reddish lucid grains, apothecia dark-brown with an even inflexed border. *Sm.*—*Lecanora virella, Ach. Syn. p.* 191.—*Lichen virellus, Ach. Prodr.*—*E. Bot. t.* 1696.

On trees and pales, in Sussex, *Mr. Borrer.*—I do not see how this can be separated from its very near affinity, *P. cycloselis;* yet Acharius, in his latest work upon Lichens, the "Synopsis," places them in different Genera. Sir J. E. Smith even expresses a doubt how far the two are really distinct as species.

21. P. *incúrva*, (*incurved yellow-green warted Parmelia*); thallus stellated membranaceous pale yellowish-green bearing yellowish powdery warts the segments much divided narrow radiating convex incurved black and spongy beneath, apothecia red-brown with an entire curved border.—*Lichen incurvus, Pers.*—*E. Bot. t.* 1375.—*L. multifidus, Dicks. Cr. Fasc.* 3. *p.* 16. *t.* 9. *f.* 7.

On rocks in Durham, *Rev. Mr. Harriman.* Scotland, *Mr. G. Don.*

22. P. *Fahlunénsis*, Ach. (*flat black Rock Parmelia*); thallus orbicular pitchy-brown smooth the segments linear sinuated flat or slightly grooved lacerated, beneath black and scarcely fibrillose, apothecia dark-brown with a crenated border.—*Ach. Syn. p.* 204.—*Lichen Fahlunensis, Linn.*—*E. Bot. t.* 653.—*Dill. Musc. t.* 24. *f.* 81.

Wales and Scotland; on rocks on the more elevated mountains.

23. P. *stýgia*, Ach. (*stygian Parmelia*); thallus stellated shining pitchy-black the segments linear multifid nearly palmated convex with a few pale warts, beneath black with a few radicles the margins and extremities decurved, apothecia of the same colour at length black with a crenated border.—*Ach. Syn. p.* 205.—*Lichen stygius, Linn.*—*E. Bot. t.* 2048.

Summits of the Highland mountains, growing on rocks. On Ben-Nevis, plentiful.

24. P. *encaústa*, Ach. (*encaustic Parmelia*); thallus stellated brownish-grey dotted with black the segments deeply and much divided linear tumid here and there constricted convex on both sides, black uneven and naked beneath, apothecia red-brown with a somewhat crenulated border.—*Ach. Syn. p.* 206.—*Lichen encaustus, Sm. in Linn. Trans. v.* 1. *p.* 83. *t.* 4. *f.* 6. *E. Bot. t.* 2049.

Plentiful on rocks, on the summit of Ben-Nevis, where it was first detected by Dr. Stuart.

25. P. *áquila*, Ach. (*sun-burnt Parmelia*); thallus orbicular tawny-brown very much divided into numerous imbricated crowded branched narrow linear segments with their margins inflexed, black and shaggy beneath, apothecia dark-brown with an incurved and crenated border.—*Ach. Syn. p.* 205.—*Lichen aquilus, Ach. Prodr.*—*E. Bot. t.* 982.—*L. fuscus, Huds.*—*Dicks.*—*L. pullus, Lightf.*—*L. obscurus, With.*—*Dill. Musc. t.* 24. *f.* 69.

On rocks, in various parts of Britain; yet not very general: most abundant on the borders of Devon and Cornwall.—Closely applied to the rock on which it grows, and remarkable for its tawny-brown hue and the very numerous and much divided narrow segments of the *thallus*.

26. P. *aleurítes*, Ach. (*mealy spreading Parmelia*); thallus orbicular continuous rugged greyish-white mealy lobed in the circumference sinuated crisped and notched, beneath of the same colour with blackish fibres, apothecia elevated plane reddish-brown with an inflexed crenulated and pulverulent border.—*Ach. Syn. p.* 208.—*Lichen aleurites, Ach. Prodr.*—*E. Bot. t.* 858.—*L. diffusus, Dicks. Cr. Fasc.* 3. *p.* 17. *t.* 9. *f.* 6.

Trunks of trees, posts, rails, &c. On the bark of firs in the north, frequent.

27. P. *ambígua*, Ach. (*yellowish powdery Parmelia*); thallus stellated pale yellow-green smooth bearing powdery warts the segments linear appressed plane dichotomous somewhat truncated, beneath brownish-black and fibrillose, apothecia near the centre small nearly plane brown their border entire.—*Ach. Syn. p.* 208. *Hook. Fl. Scot. P. II. p.* 55.—*Psora ambigua, Hoffm. Pl. Lich. f.* 2—4, *and t.* 42. *f.* 2, 3.

Trunks of fir-trees in the Highlands, especially in the northern Forests. Kinnordy, Forfarshire:—always barren.

28. P. *sinuósa*, Ach. (*sinuous imbricated Parmelia*); thallus orbicular imbricated smooth of a sulphureous-grey its segments pinnatifid with dilated cloven lobes and circular sinuses, beneath black with dense fibres, apothecia brown with a thin smooth entire border. *Sm.*—*Ach. Syn. p.* 207.—*Lichen sinuosus, E. Bot. t.* 2050.

Stones and walls, rarely on trees in Scotland, but not general: and always barren.

29. P. *parietína*, Ach. (*yellow wall Parmelia*); thallus orbicular bright-yellow the lobes marginal radiating appressed rounded crenate and crisped granulated in the centre, beneath paler and fibrillose, apothecia deep-orange concave with an entire border. — *Ach. Syn. p.* 200. — *Lichen parietinus, Linn. E. Bot. t.* 194. — *Dill. Musc. t.* 24. *f.* 76.

On trees and walls, abundant.

** *Thallus with its segments inflated at the extremity.*

30. P. *physódes*, Ach. (*inflated Parmelia*); thallus orbicular stellated glaucous-white the segments sinuato-multifid convex glabrous inflated often bearing elevated powdery warts, beneath brownish-black, apothecia red-brown with a thin elevated border. *Ach. Syn. p.* 218. — *Lichen physodes, Linn.* — *E. Bot. t.* 126. — *Dill. Musc. t.* 20. *f.* 49.

Trunks of trees, stones, and low bushes, not unfrequent. *Apothecia* very rare: on an ash-tree, near Dumfries, *Dr. Richardson.*

31. P. *diatrýpa*, Ach. (*double-coated Parmelia*); thallus substellate greenish-grey, the segments sinuato-multifid nearly plane smooth bearing powdery warts and perforated the extremities inflated, apothecia reddish brown the border inflexed entire. — *Ach. Syn. p.* 219. — *Lichen diatrypus, Ach. Prodr.* — *E. Bot. t.* 1248.

Wet rocks, among moss, rare. Foot of Snowdon, *Mr. D. Turner.* At Ballacheulish, bearing *apothecia*, *Turner* and *Hook.* — Smaller than the last, with narrower segments; forming, however, with it, a small but natural groupe of the Genus, distinguished by the *thallus*, especially at the extremity, being hollow and having a distinct upper and lower membrane. The *P. enteromorpha*, from the N. W. Coast of America, is a still more remarkable example of this tribe.

19. Stícta. *Ach.* Sticta.

Thallus foliaceous, coriaceo-cartilaginous, spreading, lobed, free and downy beneath, with little *cavities* or *hollow spots* (*cyphellæ*) often containing a powdery substance. *Apothecia* (*scutellæ*) beneath formed of the *thallus*, to which they are appressed and fixed by a central point, the *disk* coloured, plane, surrounded by an elevated *border* formed of the thallus. — Name; στικτος, *dotted*, from the depressed *spots*, or *cyphellæ*, with which the under-side of the *thallus* is dotted; and which is indeed the only technical character by which the Genus is distinguished from *Parmelia*. "These," Mr. Borrer observes, "vary much in their nature: in a few species they are merely irregular bald spots, apparently proceeding from abrasion of the surface; in others, they are powdery warts, *soredia*, without a margin; and again, in others, as in *S. macrophylla*, little pits (*cyphellæ*,) furnished with a margin from the superficial membrane of the thallus within which they are originally formed: these *cyphellæ* also

vary, being in some instances filled with a powdery substance, in others empty or merely lined with powder."—The Genus is, however, allowed, on all hands, to be a natural one. The thallus is broad, spreading, more or less coriaceous, with crowded and dilated marginal lobes.

1. S. *macrophýlla*, Fée (*broad-leaved Sticta*); thallus coriaceous imbricated naked even and green above clothed with brown fibres beneath, its segments nearly flat dilated sinuated obtuse very entire, apothecia reddish-brown with an obtuse border, cyphellæ urceolate empty whitish. *Borr.—Fée, Crypt. des Ecorces Off. t.* 33. *f.* 1.— *S. macrocarpa, Delise, MS.—l. c.* (*in text.*). *Hook. Bot. Misc. v.* 1. *p.* 17. *t.* 13. *Borrer in E. Bot. Suppl. t.* 2697.

On shady rocks, by the Turk Cascade, near Killarney, and on Cromagloun mountain, Ireland, *W. Wilson, Esq.*— Mr. Wilson was so fortunate as to discover this fine plant, which is found no where else in Europe, while on a botanizing excursion in the South of Ireland, in the summer of 1829. Hitherto the species had only been known as an inhabitant of the Mauritius, whence I possess numerous specimens, from Mr. Telfair and Professor Bojer, differing in no essential particular from our own, and according to Mr. Fée of South America, where it grows on the trunks of the Peruvian Bark Tree.

2. S. *crocáta*, Ach. (*yellow-veined Sticta*); thallus coriaceous sinuated broadly and roundly lobed very dark olive-green pitted and reticulated, the reticulations and margins bearing bright lemon-coloured powdery spots the under-side clothed with pale brown fibres, cyphellæ lemon-coloured often wanting, "apothecia brownish-black with an entire border."—*Ach. Syn. p.* 231.— *Lichen crocatus, Linn.*— *Dicks. Cr. Fasc.* 2. *p.* 22. *E. Bot. t.* 2110.

Very rare. "On rocks in the Highlands," *Mr. Dickson.*— On trees in the Duke of Argyle's grounds at Inverary, and in Glen Morriston, Inverness-shire, *Turner, Hooker, & Greville.*—This very beautiful species is, like the preceding, an inhabitant both of Britain and of tropical climates, of Bourbon, the W. Indies, and according to Acharius, also of the Cape of Good Hope and Spain.

3. S. *auráta*, Ach. (*golden-edged Sticta*); thallus coriaceous broadly and deeply lobed and sinuated waved and crisped smooth above of a reddish-brown colour the margins bearing golden-yellow powder, beneath clothed with tawny fibrous down with golden-yellow powdery cyphellæ, apothecia large flat deep-brown with a crenate border bearing golden-yellow powder.— *Ach. Syn. p.* 232.—*Lichen auratus, E. Bot. t.* 2359. *Dill. Musc. t.* 84. *f.* 12.

"Among the remains of Mr. Hudson's British Herbarium." (*Mr. Lambert in E. Bot.*) This is the only authority for this splendid and usually tropical Lichen being considered a native of Britain. I possess specimens, indeed, from the South of France. The *fruit* is so rare that no author seems to have been acquainted with it, till I described it from the solitary individual in that state in my Herbarium, found in South America,

and given to me by M. de Humboldt.—The broken *thallus* of this and the preceding species exhibits a yellow powder within.

4. S. *pulmonária* (*Lungwort Sticta*); thallus wide-spreading olive-green pale brown when dry pitted and reticulated smooth qr bearing powdery whitish warts on the reticulations and frequently elongated scattered or tufted granules deeply laciniated and broadly lobed and sinuated beneath clothed with brownish downy fibres the swellings bare, apothecia mostly marginal red-brown with a thick border. — *S. pulmonacea, Ach. Syn. p.* 233. — *Lichen pulmonarius, Linn.* — *E. Bot. t.* 572.

On the trunks of trees, in mountainous countries, frequently investing them for a considerable extent with its large shaggy-looking *fronds*.

5. S. *scrobiculáta*, Ach. (*pitted Sticta*); thallus wide-spreading greyish-green and glaucous above pitted and bearing grey mealy warts especially near the margin the segments rounded and lobed irregular beneath downy tawny with bare prominent white spots, apothecia scattered small red-brown with a thick border. — *Ach. Syn. p.* 234. — *Lichen scrobiculatus, Scop.* — *E. Bot. t.* 497. — *L. verrucosus, Huds.* — *Jacq. Coll. v.* 4. *t.* 18. *f.* 2. — *Dill. Musc. t.* 29. *f.* 114.

Trunks of trees in mountainous countries, and upon rocks among mosses, in exposed situations.

6. S. *limbáta*, Ach. (*mealy-bordered Sticta*); thallus orbicular glaucous-brown with broad and rounded lobes and with grey and powdery warts which are very copious at the margin, beneath nearly of the same colour with downy fibres and naked pale cyphellæ, apothecia brown almost imbedded in the thallus with a slightly elevated border. — *Ach. Syn. p.* 236. — *Lichen limbatus, E. Bot. t.* 1104. — *Dill. Musc. t.* 26. *f.* 100. *B. C.*

Bagley wood, Oxfordshire, *Dill.*—N. of England, Wales, and Scotland, upon rocks.—The *apothecia* I have never seen, they are figured in *E. Bot.* from Mr. Turner's Snowdon specimens.—This species seems but little known upon the Continent, and is certainly very nearly allied to the following.

7. S. *fuliginósa*, Ach. (*sooty Sticta*); thallus orbicular dark lurid-grey rough with blackish granulations broadly lobed at the margin, beneath greyish-brown downy and fibrous with bare pale sunken spots or cyphellæ, apothecia scattered red-brown flat with a thick fringed border, at length convex with the border obliterated. — *Ach. Syn. p.* 236. — *Lichen fuliginosus, Dicks.* — *E. Bot. t.* 1103. — *Dill. Musc. t.* 26. *f.* 100. *A.*

On rocks and trees in subalpine countries, frequent.—Its *fructification* is very rare. I am indebted for excellent specimens in that state to my valued friend Dr. Richardson, who gathered them on trees near Dumfries. "The *shields*," he observes, "are not marginal; when young, they are covered with a thin membranaceous border, which is lacerated or rather regularly toothed (bearing a striking resemblance to the *peridium* of *Phacidium coronatum*). In an older state, the *disk* is swollen and the *border* nearly obliterated." *Richardson in litt.*—This and the

following species have a remarkably fetid smell, which has been compared to that of the urine of mice.

8. S. *sylvática*, Ach. (*pitted wood Sticta*); thallus spreading of a greenish-rusty hue (brown and glossy when dry) somewhat pitted and often rough with grey scattered granulations, deeply divided into lobed and sinuated rather ascending segments, beneath tawny-brown downy and fibrous with pale naked cyphellæ, apothecia "on marginal segments vertical convex dark-brown." — *Ach. Syn. p.* 236. — *Lichen sylvaticus, Huds.* — *E. Bot. t.* 2298. *Jacq. Coll. v.* 4. *t.* 12. *f.* 2. — *Peltigera sylv. Hoffm. Pl. Lich. v.* 1. *t.* 4. *f.* 2. — *Dill. Musc. t.* 27. *f.* 101.

Shady woods, about the roots of trees in mountainous countries: frequent in Scotland. — The *fructification* is unknown to me, except from the figures of Jacquin and Hoffman; but Sir Jas. E. Smith confirms the correctness of these by the recollection of a fine specimen in that state sent by Dr. Burgess to Dr. Hope. The *apothecia* are terminal, on peculiar segments of the frond, and are very similar to those of a *Peltidea*, to which genus (his *Peltigera*) Hoffmann indeed referred it; but from which it is distinguished by the presence of *cyphellæ*, the underside of the frond.

** *Thallus, in a moist state, of a gelatinous substance.*

Fam. X. Collemateæ.

20. Collema. *Ach.* Collema.

Thallus entirely of one substance, gelatinous, when dry generally becoming hard and cartilaginous, polymorphous, granulated, foliaceous, lobed, laciniated or branched. *Apothecia* (*scutellæ*) orbicular, sessile (rarely stipitate), bordered, entirely formed of the substance of the *thallus*, the *disk* sometimes coloured. — Named from κολλα, *gluten;* on account of the gelatinous nature of the whole plant. — In drying these plants are necessarily much altered in form, and from this and their variable character there is considerable difficulty in the determination of the species.

* *Thallus somewhat crustaceous, uniform.*

1. C. *nígrum*, Ach. (*inky Collema*); crust of a sooty-black composed of very minute imbricated lobed and cut leaflets the margin bluish, apothecia scattered small black at first bordered and concave at length convex. — *Ach. Syn. p.* 308. — *Lichen niger, Huds.* — *E. Bot. t.* 1161.

On shady rocks, especially such as are calcareous. This *lichen* forms ink-like stains upon the rocks on which it grows.

** *Thallus rather broadly lobed over the whole surface, imbricated, plaited, spreading, and becoming very turgid when wet.*

2. C. *microphýllum*, Ach. (*small-lobed Collema*); lobes of the thallus crowded imbricated minute pulpy much divided, ultimate segments roundish crenulate somewhat convex, apothecia

sessile with a raised entire border at length flat. — *Ach. Lich. Univ. p.* 630. *Syn. p.* 310. — *E. Bot. Suppl. t.* 2721.

On Elm bark, near Bury, Suffolk, *Rev. G. R. Leathes;* and sent by *Mr. D. Turner* to *Acharius*, who has also received it from Sweden, France and Switzerland. — "The *crust* of this *Collema* is considerably like the supposed *thallus* of the very anomalous *Lichen spongiosus*, *E. Bot. t.* 1374. It has not the fibrous black substratum of *Lecidea microphylla*, *t.* 2128., to which Acharius compares it, and to some states of which it has, in other respects, much resemblance. The species is more likely to be confounded with *C. fragrans*, *E. Bot. t.* 1912., but the thallus of that lichen is less imbricated, with larger less-divided lobes, the edges of which are less notched or crenated, and somewhat raised, and the surface has not the powdered or granulated appearance when dry." *Borr.*

3. C. *cheiléum*, Ach. (*lipped Collema*); thallus snborbicular imbricated lobes thick all minute rounded crenulated ascending, apothecia nearly plane aggregated of the same colour as the thallus, the border crenulated subevanescent. *Ach. Syn. p.* 310. *Hook. Fl. Scot. P. II. t.* 71. — *Lichen marginatus*, *Bernh. in Schrad. Journ.* 1799, 1. *p.* 6. *t.* 1. *f.* 2. *a*. *Dicks. Cr. Fasc.* 4. *p.* 25.

Roots of trees, in shady subalpine woods, Scotland, *Mr. Dickson.*

4. C. *frágrans*, Ach. (*fragrant Collema*); thallus suborbicular olive-black its lobes ascending crowded rounded thick-edged crenate smooth, apothecia tawny with a thick olive border. *Sm.* — *Ach. Syn. p.* 311. — *Lichen fragrans*, *E. Bot. t.* 1912.

On trunks of Elm and Ash in Kent, Surrey and Sussex, *Mr. Borrer.* — This plant "is remarkable when moistened for its very sweet aromatic scent, not unlike the *spiritus volatilis aromaticus* of the apothecaries, though of course much fainter," (*Sm.*); but Mr. Borrer observes that this was probably accidental, for he finds no odour except what is often perceptible in other pulpy *Collemata*, especially in specimens that have been dried and subsequently moistened.

5. C. *cristátum*, Ach. (*crested Collema*); thallus thick olive-black suborbicular very compact cut into numerous plaited notched nearly erect lobes those of the circumference depressed larger crenulated obtuse, apothecia scattered red-brown slightly concave with an elevated irregular border. — *Lichen cristatus*, *Huds.* — *Linn.* — *Jacq. Coll. v.* 3. *p.* 139. *t.* 12. *f.* 1. — *L. crispus*, *E. Bot. t.* 834. — *L. pulposus*, *Bernh. in Schrad. Journ. Bot.* 1799, 1. *p.* 7. *t.* 1. *f.* 1. *a*. — *Collema pulposum*, *Ach. Syn. p.* 311.

On the ground, among rocks and on mosses, in various places. — I have taken advantage, in adducing the synonyms of this plant, of Mr. Borrer's remarks given here under *C. crispum*, our No. 24.

6. C. *limósum*, Ach. (*mud Collema*); lobes of the thallus scattered appressed thick and pulpy flattish slightly crenulate almost evanescent in drying, apothecia immersed the border at length somewhat prominent nearly entire. *Borr.* — *Ach. Syn. p.* 309. *Bor. in E. Bot. Suppl. t.* 2704. *f.* 1. — *Lichen limosus*, *Ach. Prodr.* (*excl. syn. Hoffm.*)

Perhaps common on wet clayey soils; Hurst-pierpoint, Sussex, *Mr.*

Borrer.—"The near affinity of this little *Lichen* with the *L. crispus* of *E. Bot.* is obvious, and it may possibly be but a *variety*; yet the scattered mode of growth and the less tenacious substance of the *thallus* which almost disappears in drying, seem to indicate a specific difference." *Borr.*

7. C. *túrgidum*, Ach. (*turgid Collema*); thallus irregularly spreading depressed slightly lobed and subimbricated, the lobes elevated thick verruciform rugged granulated, apothecia sessile urceolate dull-brown, the border somewhat inflexed and tumid externally rough with granulations. *Ach. Syn. p.* 313.

On stones, among mosses, England (*Ach.*).—Acharius appears to have received this plant from England, but he has not stated upon whose authority it is a native, and I am totally unacquainted with the species.

8. C. *ténax*, Ach.? (*tenacious Collema*); thallus rather glaucous fleshy imbricated the lobes obtuse somewhat palmate, apothecia depressed dilated reddish. *Ach. Syn. p.* 314. — *Lichen tenax*, *E. Bot. t.* 2349. (*not Swartz, nor Bernhardi.*)

Alpine situations, among mosses, N. Wales, *Rev. H. Davies*—See remarks under the next species.

9. C. *ceranoídes*, Borr. (*horned Collema*); lobes of the thallus imbricated ascending pulpy dilated upwards proliferous terminated with crowded erect elongated granules overtopping the flattish apothecia. *Borr. in E. Bot. Suppl. t.* 2704. *f.* 2. — *Collema palmatum*, *α. Ach. Syn. p.* 319.?

On chalky soil of the Sussex Downs, *Mr. Borrer.* Box-Grove, near Chichester, *Mr. R. J. T. Thomas.* Hexham, Essex, *Mr. E. Forster.*—"*C. ceranoides* is nearly allied to *C. cristatum*, with the larger *vars.* of which it is, in all probability, often confounded; but it is distinguishable by the clustered fastigiate grauules, or ramuli, which compose its surface. Acharius seems to have taken it for *Lichen palmatus* of *Huds.*; but, whatever this one plant may have been, that figured by *Dill. t.* 19. *f.* 30., is proved, by the specimen preserved in his herbarium, to be the *L. palmatus* of *E. Bot. t.* 1635., with which the description in the *Hist. Musc.* likewise accords. To this the *β.* of Ach. (*C. corniculatum Hoffm.*), probably belongs. It is possible that the species before us may be the *L. tenax*, *E. Bot. t.* 2349., the original specimen of which has been sought in vain in the Smithian collection. We have seen neither authentic specimens of the *L. tenax* of Swartz, nor Acharius' figure in the Stockholm Transactions, but the *L. tenax* of Bernhardi's paper in Schrader's *Journ.*, which is regarded as the same with Swartz's, must necessarily, from the figure, be a different lichen from ours." *Borr.*

10. C. *plicátile*, Ach. (*plaited Collema*); thallus orbicular imbricated all the lobes thick rounded plaited ascending entire, apothecia reddish-brown concave crowded. — *Ach. Syn. p.* 314. *E. Bot. t.* 2348. — *Lich. plicatilis*, *Ach. in Act. Holm. v.* 16. *p.* 11. *t.* 1. *f.* 2.

On wet or inundated rocks, in alpine situations.

11. C. *fluviátile*, Ach. (*River Collema*); thallus thick imbricated greenish-black, its segments obovate or linear convex proliferous channelled beneath, apothecia globose concave brown,

Sm. — *Ach. Syn. p.* 314. — *Lichen fluviatilis, Huds.* — *E. Bot. t.* 2039. — *Dill. Musc. t.* 19. *f.* 28.

On calcareous rocks, in the stream near its source, at Malham Cove, Yorkshire. Snowdon, *Dillenius.*

12. C. *multipartítum*, Sm. (*many-branched Collema*); thallus radiating fleshy, segments repeatedly forked fan-shaped crenate convex above concave beneath, apothecia prominent at length blackish and flat. *E. Bot. t.* 2582.

On walls and rocks, Killarney, Ireland, abundant, *Sir T. Gage.* Westmoreland, *Sir J. E. Smith.*

13. C. *marginále* (*marginal Collema*); thallus imbricated olive-black, its lobes linear parallel zigzag channelled crisped crenate branched smooth, apothecia marginal dark reddish-brown with an entire border. — *Lichen marginalis, Huds.* — *E. Bot. t.* 1924. — *Collema melænum, β. Ach. Syn. p.* 316. — *Dill. Musc. t.* 19. *f.* 25.

On calcareous stones, in moist places, often among mosses.

14. C. *fasciculáre*, Ach. (*clustered Collema*); thallus suborbicular the lobes dilated upwards plaited waved inciso-crenate, apothecia marginal shortly stalked clustered turbinate reddish. *Sm.* — *Ach. Syn. p.* 317. — *Lichen fascicularis, Linn.* — *E. Bot. t.* 1162. — *Dill. Musc. t.* 19. *f.* 27.

On the mossy trunks of trees: frequent in Scotland. — The lobes of the *thallus* are often obliterated by the exceedingly numerous *apothecia.*

15. C.? *corrugátum*, Ach. (*corrugated Collema*); gelatinous thick black-green with elevated intestiniform convolutions. *Dicks.* — *Ach. Syn. p.* 318. — *Lichen corrugatus, Dicks. Cr. Fasc.* 4. *p.* 26. — *Dill. Musc. t.* 19. *f.* 19.

On rocks near the sea, Sussex, *Dillenius.* On rocks and stones, *Dickson.* — Nothing seems to be known of this by any living Botanist. It is probably a marine production and far removed from any Lichen.

16. C. *cretáceum*, Ach. (*Chalk Collema*); thallus minute lobed simple stellated dark-olive bearing a central solitary elevated brownish flesh-coloured apothecium with a paler elevated entire border. *Sm.* — *Ach. Syn. p.* 328. — *Lich. cretaceus, E. Bot. t.* 738.

Common on chalk and on the white coating of flint-stones, *Smith.* — This appears to be a young state of some other species, probably of *C. tenuissimum.*

*** *Thallus somewhat foliaceous, thin, lobed principally in the circumference.*

17. C. *palmátum* (*palmated Collema*); thallus tufted nearly erect greenish-brown its segments thin linear many-lobed somewhat palmate revolute, apothecia scattered reddish. *Sm.* — *Lichen palmatus, Huds.* — *E. Bot. t.* 1635. — *Collema palmatum, β.* (*not α*). *Ach. Syn. p.* 319. — *C. corniculatum, Hoffm.* — *Dill. Musc t.* 19. *f.* 30.

Upon the ground, among mosses. Sandy soil by the sea, near Yarmouth, abundant, *Mr. D. Turner.*

18. C. *saturnínum*, Ach. (*saturnine Collema*); thallus foliaceous submembranaceous dark-greenish lead-coloured glaucous and downy beneath, its lobes rounded wavy, apothecia scattered reddish-brown with a thin entire border. — *Ach. Syn. p.* 320. — *Lichen saturninus, Sm. in Linn. Tr. v.* 1. *p.* 84. *Dicks. Cr. Fasc.* 2. *p.* 21. *t.* 6. *f.* 8. *E. Bot. t.* 1980.

Trunks of trees, in mountainous districts; not unfrequent in Scotland. — *Fructification* very scarce.

19. C. *Burgéssii*, Ach. (*Dr. Burgess' Collema*); thallus foliaceous somewhat imbricated glaucous greenish-brown much lobed sinuated curled in the centre as well as in the circumference downy and somewhat spongy beneath, apothecia copious depressed flattish brown, their border crisped and foliaceous. — *Ach. Syn. p.* 320. — *Lichen Burgessii, Lightf. Scot. p.* 827. *t.* 26. *E. Bot. t.* 300.

On trees in Scotland, not unfrequent, especially near water; and in the West Highlands. Cardiganshire, *Sir J. E. Smith.*

20. C. *tunæfórme*, Ach. (*sooty Collema*); thallus foliaceous membranaceous somewhat wrinkled black-green with scattered fuliginous powder, the lobes oblong deeply cut sinuato-laciniated obtuse flexuose and crisped subcrenate, the apothecia scattered few flattish brown with an entire border. *Ach. Syn. p.* 322. *Winch, Fl. of North. and Durh. p.* 93. — *Lichen tunæformis, Ach. in Nov. Act. Holm. v.* 16. *p.* 17. *t.* 1. *f.* 6. — *Dicks. Cr. Fasc.* 4. *p.* 25.

Rocks, near Wigmere, Hereford, *Mr. Dickson.* Limestone rocks, about Egleston and Middleton in Teesdale, Durham, *Rev. J. Harriman.* Near Wycliff in the same county, *Mr. Winch.* — I am unacquainted with this species.

21. C. *nigréscens*, Ach. (*blackish or Bat's-wing Collema*); thallus foliaceous membranaceous somewhat solitary orbicular rugged and broadly lobed dark olive-green, apothecia central crowded at length convex reddish-brown elevated with an entire border. — *Ach. Syn. p.* 321. — *Lichen nigrescens, Huds.* — *E. Bot. t.* 345. — *L. Vespertilio, Lightf.* — *Dill. Musc. t.* 19. *f.* 20.

Trunks of trees in damp woods, and shady rocks.

22. C. *fláccidum*, Ach. (*flaccid Collema*); thallus foliaceous membranaceous smooth dark blackish-green its lobes ascending rounded plaited entire, apothecia scattered reddish flattish with entire border. — *Ach. Syn. p.* 322. — *Lichen flaccidus, Ach. Prodr.* — *E. Bot. t.* 1653. — *L. rupestris, Linn. fil.* — *L. nigrescens, Ehrh. Crypt.*

Trees and rocks, chiefly in hilly or mountainous countries.

23. C. *granulátum*, (*granulated Collema*); thallus foliaceous membranaceous granulated on both sides of a blackish-olive colour with tufted cottony radicles beneath, its lobes crowded rounded plaited crisped and cut, apothecia scattered dark brown. — *Lichen granulatus, Huds.* — *E. Bot. t.* 1757. — *Collema*

furvum, Ach. Syn. p. 323. — *Lichen furvus, Ach. in Nov. Act. Holm. v.* 22. *p.* 164. *t.* 10. *f.* 2. — *Dill. Musc. t.* 19. *f.* 24. ?

On the ground, Sussex, Kirkby Lonsdale, &c. Gravel walks, Oxford? *Dillenius.* — " Distinguished from the following by its larger lobes, more pulpy when wet and sprinkled on both surfaces with granules which do not become leafy, and by the smaller almost stalked *scutellæ* with an entire elevated border." *Borr.*

24. C. *crispum*, Borr. (*curled Collema*); lobes of the thallus thinnish much divided their segments imbricated crowded rounded concave with entire or denticulate raised edges, apothecia sessile the border crenulate at length leafy. — *Borr. in E. Bot. Suppl. t.* 2716. *f.* 1. — *Lichen crispus, Linn.* — *Dill. Musc. t.* 19. *f.* 23.

Not uncommon on stones and walls, sometimes on the ground. — " This Lichen only is preserved in the Dillenian Herb., as the plant fig. in the *Hist. Musc.;* it must therefore be regarded as the *L. crispus* of *Huds.* and *Linn.*, and ought to retain the name. It is possible that *C. crispum, a. Ach. Syn. p.* 311., may belong to this species; but it is more probable that it stood better, with all the *vars.*, where he had placed it in the *Lich. Univ.*, under *C. pulposum* (*L. pulposus*, Bernh.), which is the *L. crispus, E. Bot. t.* 834. The latter is excellently described by Wulfen (in *Jacquin's Collect. v.* 3. *p.* 139. *t.* 12. *f.* 1.) as the *L. cristatus, Linn.*, a species adopted, as *L. crispus* was, from *Huds.* and *Dill.* In this instance, the Dillenian Herbarium fails us; for under the No. (*t.* 19. *f.* 26.) to which Hudson refers as his *L. cristatus*, are preserved one specimen of the larger *var.* of *C. pulposum, Ach.* (usually regarded as *L. cristatus*), others of the plant now before us, and one or two of our *C. ceranoides.* The figs. and descr. in the *Hist. Mus.* do not decide the question. We have not examined the specimens in the Herbaria of Sherard and Buddle. At present, therefore, we would call the species *cristatum* instead of *pulposum;* since it cannot be doubted that the larger *var.* at least, which grows on the ground and has more erect and more laciniated lobes, was contemplated by Hudson, and the places of growth which he mentions, lead to the presumption that he included the smaller and more common form also. From all the states of that very variable Lichen, our *C. crispum* is readily and satisfactorily distinguished by its thinner and more leaf-like lobes." *Borr.*

25. C. *dermatínum*, Ach. (*skinny Collema*); lobes of the thallus between gelatinous and coriaceous rounded with ascending sinuated edges, upper surface sprinkled with granules, apothecia somewhat stalked, the border narrow entire slightly raised. — *Ach. Lich. Univ. p.* 648. *Syn. p.* 322. — *Dill. Musc. t.* 19. *f.* 22. *E. Bot. Suppl. t.* 2716. *f.* 2.

On calcareous rocks; in *fruit*, N. Wales, *Mr. Griffith:* barren, in Leigh Wood near Bristol, *Mr. Forster.* — " *Thallus* about as thick as in *C. crispum*, its lobes larger and less divided; *apothecia* much like those of *C. granulatum, E. Bot. t.* 1757. and *C. flaccidum, t.* 1653.; but the *thallus* is much less thin and membranous than in the latter, the *lobes* less entire and the *granules* not so numerous nor so minute; while the lobes are less concave than in *C. granulatum* and the granules are confined to the upper surface, and the tufted cottony radicles are wanting. Judging from the specimen sent by Acharius to the Linn. Society, the *C. thysanæum* of that author is but a *var.* of *C. dermatinum.*" *Borr.*

26. C. *sinuátum* (*sinuated Collema*); thallus foliaceous membranaceous imbricated dark glaucous-green, the lobes crowded small rounded incised nearly entire suberect plaited, apothecia scattered sessile brownish, the border entire. — *Lichen sinuatus, Huds.* — *E. Bot. t.* 772. — *Collema Scotinum, β. Ach. Syn. p.* 374. — *Dill. Musc. t.* 19. *f.* 33.

On rocks and walls and among mosses. Appin, Scotland, *Capt. Carmichael.*

27. C. *tremelloídes*, Ach. (*Nostoc-like Collema*); thallus foliaceous membranaceous thin smooth on both sides subdiaphanous leaden-green, entirely lead-coloured and opaque when dry, the lobes ascending rounded somewhat cut, apothecia scattered rather elevated flat reddish with a smooth pale border. — *Ach. Syn. p.* 325. — *Lichen tremelloides, Linn.* — *E. Bot. t.* 1981. — *L. cochleatus, Dicks. Cr. Fasc.* 1. *p.* 13. *t.* 2. *f.* 9.

Upon rocks, among mosses in mountainous countries, especially (in Scotland) near the sea. — Dark-coloured and pellucid as are the *fronds* of this *Lichen* when fresh and moist, they are singularly opaque and pale leaden-coloured when dry.

28. C. *lácerum*, Ach. (*jagged Collema*); thallus foliaceous membranaceous subdiaphanous ascendant bluish-brown the lobes dilated finely jagged and fringed, apothecia scattered minute concave red with a thick border. — *Ach. Syn. p.* 327. — *Lichen lacerus, Ach. Prodr.* — *L. lacer, E. Bot. t.* 1982. — *L. tremelloides, Huds.* — *Tremella lichenoides, Linn.*

Upon walls and rocks among mosses, in various situations.

**** *Thallus cut into numerous slender branches.*

29. C. *subtíle*, Ach. (*fine-spun Collema*); thallus blackish-green substellated cut into numerous minute very narrow linear imbricated and appressed bluntish laciniæ, apothecia central nearly plane brownish with a narrow entire border. — *Ach. Syn. p.* 328. — *Lichen subtilis, Schrad.* — *Bernh. in Schrad. Journ. v.* 1. *p.* 5. *t.* 2. *f.* 6. *Dicks. Cr. Fasc.* 4. *p.* 28. *E. Bot. t.* 1008.

On moist earth, especially of a clayey nature.

30. C. *tenuíssimum*, Ach. (*fine-cut Collema*); thallus imbricated cut into numerous minute linear multifid unequal granulated rather acute very crowded segments of a greenish-black colour, apothecia scattered nearly flat reddish-brown with a thick entire border. — *Ach. Syn. p.* 328. — *Lichen tenuissimus, Dicks. Cr. Fasc.* 1. *t.* 2. *f.* 8. *E. Bot. t.* 1427.

On dry sandy banks, among mosses and short grass.

31. C. *Schradéri*, Ach. (*Schraderian Collema*); thallus cæspitose erect branched the branches linear forked compressed wrinkled here and there constricted obtuse, apothecia lateral reddish with a pale border. — *Ach. Syn. p.* 328. *E. Bot. t.* 2284. — *Lichen Schraderi, Bernh. in Schrad. Journ.* 1799. *v.* 1. *p.* 22. *t.* 2. *f.* 5.

On the ground, in clayey soil, among mosses, on rocks and on walls.

32. C. *muscícola*, Ach. (*Moss Collema*); thallus tufted suffruticulose very minute olive-black pulvinate, branches cylindrical divided subfastigiate rather obtuse wavy and uneven, apothecia nearly terminal horizontal flattish brown with an entire border. —*Ach. Syn. p.* 328. —*Lichen muscicola, Ach. Prodr.* —*Ach. in Nov. Act. Holm.* 1795. *p.* 12. *t.* 1. *f.* 3. *Dicks. Cr. Fasc.* 2. *p.* 23. *t.* 6. *f.* 9. *E. Bot. t.* 2264.

On rocks, among mosses, in mountainous countries.

33. C. *spongiósum*, Ach. (*spongy Collema*); thallus dull-green, the segments clustered much branched granulated cylindrical obtuse, apothecia scattered concave brown externally spongy and pale with a thin upright border. *Sm.* —*Ach. Syn. p.* 329. —*Lichen spongiosus, E. Bot. t.* 1374.

Upon the ground, among mosses, in subalpine countries, not very uncommon. — The *apothecia* are peculiarly large and peziza-like, and they often appear to be sunk in the comparatively obscure *thallus* of this curious *Lichen*.

Fam. XI. Peltigereæ.

21. Solorína. *Ach.* Solorina.

Thallus foliaceous, coriaceous, lobed, free beneath, having fibrous or woolly veins. *Apothecia* (*peltæ*) adnate, sometimes immersed, orbicular (distant from the margin), not bordered. — Name; σολος, a *disk* or *orb*, and ῥινος, a *shield;* from the orbicular shield-like fructifications. — A genus which scarcely differs from *Peltidea*, except in the situation of the apothecia.

1. S. *crócea*, Ach. (*saffron Solorina*); thallus green (brown when dry) lobed veiny beneath and of a fine orange-saffron colour, apothecia red-brown somewhat tumid nearly even with the thallus. —*Ach. Syn. p.* 8. —*Lichen croceus, Linn.* —*Jacq. Coll. v.* 4. *t.* 11. *f.* 2, 3. *E. Bot. t.* 498. —*Dill. Musc. t.* 30. *f.* 120.

Summits of the Highland mountains, upon the ground, among rocks.

2. S. *saccáta*, Ach. (*Socket Solorina*); thallus green (grey when dry) lobed whitish and fibrous beneath, apothecia dark-brown in deep pits in the thallus nearly plane. —*Ach. Syn. p.* 8. —*Lichen saccatus, Linn.* —*E. Bot. t.* 228. —*Dill. Musc. t.* 30. *f.* 121.

Upon the ground in the clefts of rocks, in shady situations, in mountainous districts.

22. Peltidéa. *Ach.* Peltidea.

Thallus foliaceous, coriaceous or membranaceous, spreading, lobed, with woolly veins beneath, the lobules fertile. *Apothecia* (*peltæ*) suborbicular, adnate on the *upper side* of the lobules or proper portions of the *thallus* and having a border formed of the thallus. — Named from *pelta*, a *shield*, which the apothecia resemble.

1. P. *venósa*, Ach. (*black-veined Peltidea*); thallus ascendant small green and smooth above (grey when dry) irregularly lobed, beneath white downy with dark prominent reticulated veins, apothecia marginal plane dark red-brown orbicular. — *Ach. Syn. p.* 237. — *Lichen venosus, Linn.* — *E. Bot. t.* 887. — *Dill. Musc. t.* 28. *f.* 109.

On the earth among rocks, in alpine districts.

2. P. *scutáta*, Ach. (*target-fruited Peltidea*); thallus ash-coloured white and veiny beneath the lobes oblong rounded sinuated and cut powdery, fertile ones very short, apothecia (small) orbicular ascending dark-brown the border nearly entire. — *Ach. Syn. p.* 237. — *Lichen scutatus, Dicks. Cr. Fasc.* 3. *t.* 18. (*excl. the synonym.*) *E. Bot. t.* 1834.

On old trees, among mosses, Inverary. Ardtur, *Capt. Carmichael.* Abundant in woods near Rae hills, *Sir W. Jardine and Dr. Greville.* Westmoreland, *Sir J. E. Smith.*

3. P. *horizontális*, Ach. (*brown horizontal Peltidea*); thallus glaucous brownish-green lobed crenate and shining, beneath pale with numerous brown branching reticulated veins, fertile lobes short, apothecia plane horizontal transversely oblong red-brown with a nearly entire border. — *Ach. Syn. p.* 238. — *Lichen horizontalis, Linn.* — *E. Bot. t.* 888.

Moist shady rocks and about the roots of trees, in mountainous countries.

4. P. *aphthósa*, Ach. (*Thrush Peltidea*); thallus light-green smooth sprinkled with brown warts and having broad rounded lobes the fertile ones contracted their sides reflexed, apothecia large ascending red-brown with a jagged border. — *Ach. Syn. p.* 238. — *Lichen aphthosus, Linn.* — *E. Bot. t.* 1119. — *Dill. Musc. t.* 28. *f.* 106.

Moist shady alpine rocks, among moss and generally near water. — This is the finest British species of the Genus: it derives its name from a circumstance related by Linnæus, that the Swedish peasants boil it in milk as a cure for the aphthæ, or *thrush*, in children.

5. P. *canína*, Ach. (*canine Peltidea*); thallus thick glaucous-grey greenish when moist somewhat furrowed with rounded lobes fertile ones with the sides reflexed, beneath white with brownish branching veins and fibres, apothecia vertical revolute reddish-brown with a subcrenulated border. — *Ach. Syn. p.* 239. — *Lichen caninus, Linn.* — *E. Bot. t.* 2229. *Woodv. Med. Bot. Suppl. t.* 273. — *Dill. Musc. t.* 27. *f.* 102.

Upon the ground, among moss, on roofs of houses, trees, &c. very common. — Formerly employed, at the suggestion of Dr. Mead, as a cure for the bite of a mad-dog, whence the specific name.

6. P. *spúria*, Ach. Meth. (*imperfectly-veined Peltidea*); thallus ash-coloured and even above whitish smooth with indistinct pale veins beneath, apothecia ascending roundish dark reddish-

brown. *Sm.* — *Ach. Meth. p.* 283. *t.* 2. *f.* 2. — *Lichen spurius, Ach. Prodr.* — *E. Bot. t.* 1542.

Hedge-banks in Sussex and Suffolk. — This and the two following species I am not at all times able to distinguish from *P. canina.* The present, established by Acharius, appears to me as distinct as any, yet in his *Synopsis*, the same author has referred it to the common state of *P. canina.* — It forms small ascendant *fronds*, almost every *lobe* of which is fertile: *apothecia* rather large.

7. P. *ruféscens*, Ach. Meth. (*dark-coloured Ground Peltidea*); thallus rigid concave even dark reddish-brown pale downy with obsolete veins beneath, the lobes rounded with numerous fruit-bearing processes, apothecia vertical roundish dark-brown with a pale border. *Sm.* — *Lichen rufescens, Neck. Musc.* — *E. Bot. t.* 2300. — *L. caninus, β. rufescens, Huds.* — *Lightf.* — *Peltidea canina, β. crispa, Ach. Syn. p.* 239. — *Dill. Musc. t.* 27. *f.* 103.

On banks, among grass and mosses, frequent. — This again seems to be a *Lichen*, respecting which the great Acharius has changed his opinion; which ought to teach us caution, at least, in adopting it as a species, for except in hue, it seems scarcely different from the preceding.

8. P. *polydáctyla*, Ach. (*many-fingered Peltidea*); thallus glaucous-green naked glabrous with brown reticulated veins beneath, fertile lobules very numerous and crowded and as well as the brown terminal apothecia cucullato-revolute. — *Ach. Syn. p.* 248. *Hook. Fl. Scot. P. II. p.* 61. — *Peltigera polydactyla, Hoffm. Fl. Germ.* — *Lichen polydactylus, Jacq. Coll. v.* 4. *t.* 14. *f.* 2. a. b. — *Lichen caninus, γ. Lightf.* — *Dill. Musc. t.* 28. *f.* 107, 108.

On the ground, on grassy or mossy banks and on low walls, frequent. — This was well distinguished by Dillenius and Lightfoot, as also by Acharius; but whether it ought to constitute a species, is a point I am unable to determine.

23. Néphroma. *Ach.* Nephroma.

Thallus foliaceous, coriaceous or membranaceous, spreading, lobed, naked or hairy beneath, the *lobules* fertile. *Apothecia* (*peltæ*) orbicular, reniform, adnate on the *underside* of the lobules or proper portions of the thallus and having a border formed of the thallus. — Named from νεφρος, a *kidney* and ομη (or rather ομος), *like*, from the kidney-shaped apothecia. — This differs from *Peltidea* only in the situation of the *apothecia.*

1. N. *resupináta*, Ach. (*resupinate Nephroma*); thallus greyish-brown smooth lobed and imbricated, fertile lobules very short erect pale pubescent and granulated beneath, apothecia large numerous red-brown with an uneven border. — *Ach. Syn. p.* 241. — *Lichen resupinatus, Linn.* — *E. Bot. t.* 305. — *Dill. Musc. t.* 28. *f.* 105.

Trees and mossy rocks, chiefly in subalpine districts.

2. N. *parílis*, Ach. (*Chocolate Nephroma*); thallus somewhat coriaceous lobed jagged crenate and wavy greenish or pur-

plish-brown besprinkled with superficial or marginal dark powdery warts, apothecia red-brown broader than long on short proper lobules.—*Ach. Syn. p.* 242.—*Lichen parilis, Ach. Prodr.* —*E. Bot. t.* 2360.

In an old stone-quarry, in Shropshire, *Rev. E. Williams* (*E. Bot.*).—I am not aware that any British botanist has met with this *Lichen*, except Mr. Williams; nor was he so fortunate as to detect its fructification, which Acharius describes from Swedish specimens. Sir J. E. Smith found it in Switzerland, but always barren.

b. *Attachment of the more or less orbicular thallus by the centre.*

Fam. XII. Umbilicarieæ.

24. Gyróphora. *Ach.* Gyrophora.

Thallus foliaceous, coriaceous or membranaceous, fixed by the centre, peltate. *Apothecia* (*tricæ* or *gyromata*) orbicular, subscutelliform, sessile and adnate, covered by a black membrane, the *disk* marked with concentric *circles* or *plicæ*, with a *border* of its own substance. — Name; γυρος, a *circle*, and φορος, *fertile*, from the peculiar nature of the apothecia. — Various species of this Genus (and they are found in cold rocky situations, especially on granite, in almost all parts of the world) constitute the *Tripe de Roche* of the Canadians and with *G. proboscidea*, *G. vellea*, and a few other American ones, Capt. Sir J. Franklin and his brave companions were supported in Arctic America, during a season of want such as, happily, few human beings have been subjected to. They are, however, bitter and nauseous, and can only be employed in the total absence of every other salutary food.

1. G. *polyphýlla* (*many-leaved Gyrophora*); thallus naked and smooth on both sides dark-olive brown shining above dull-black beneath variously lobed at the margin simple or many-leaved, apothecia convex rough and plaited.—*Lichen polyphyllus, Linn.* —*E. Bot. t.* 1282.—*Umbilicaria polyphylla, Schrad.*—*Hoffm. Pl. Lich. t.* 59. *f.* 2.—*Gyrophora glabra, Ach. Syn. p.* 63.—*Lichen glaber, Ach. Meth.* — *Umbilicaria ænea, α. Schær. Lich. Helv. Spicil. p.* 90. *Lich. Exsicc. n.* 149. —*Dill. Musc. t.* 30. *f.* 129.

Rocks in mountainous countries, frequent.

2. G. *proboscídea*, Ach. (*Proboscis Gyrophora*); thallus simple membranaceous rugose with elevated reticulations of a smoky-brown colour lobed and erose at the margin beneath subfibrillose and paler, apothecia rather convex variously plaited. —*Ach. Syn. p.* 64. *E. Bot. t.* 2484.—*Lichen proboscideus, Ach. Prodr. p.* 147.—*L. deustus, Lightf.*—*Umbilicaria polymorpha, β. Schær. Lich. Helv. Spicil. p.* 88. *Lich. Exsicc. n.* 148.—*Umbilicaria congesta, Hoffm. Pl. Lich. t.* 43. *f.* 4—7.—*β. arctica;* thicker and more rigid, more obtusely corrugated and sprinkled

with warts. *Ach. Syn.* — *G. arctica, Ach. Meth. p.* 106. *t.* 2. *f.* 6. *E. Bot. t.* 2485. — *Umbilicaria polymorpha,* α. F. *Schær. Lich. Helv. Spicil. p.* 88.

Mountain-rocks ; abundant in the Highlands of Scotland.

3. G. *deústa,* Ach. (*burnt Gyrophora*) ; thallus membranaceous roundly lobed brown upper side more or less granulated, under side cellular and reticulated smooth and naked, apothecia with circular plaits at length convex. *Sm.*—*Ach. Syn. p.* 66.—*E. Bot. t.* 2483.—*Lichen deustus, Linn.*—*Umbilicaria flocculosa, Hoffm. Pl. Lich. t.* 68. *f.* 1—4.—*Lichen flocculosus, Wulf. in Jacq. Coll. v.* 3. *p.* 98. *t.* 1. *f.* 3.— *Umbilicaria ænea,* γ. *Schær. Lich. Helv. Spicil. p.* 91. *Lich. Exsicc. n.* 152.

Rocks in the Highland mountains. — This appears to me, both from my own specimens and from the figure in E. Bot., to be too nearly allied to *G. proboscidea.*

4. G. *erósa,* Ach. (*corroded Gyrophora*) ; thallus simple membranaceous rugged almost black irregularly lobed erose and perforated at the circumference the segments convex beneath dark-grey somewhat granulated aud partially shaggy, apothecia convex variously plaited. — *Ach. Syn. p.* 65. — *E. Bot. t.* 2066. — *Schær. Lich. Helv. Spicil. p.* 93. *Lich. Exsicc. n.* 153.— *Umbilicaria erosa, Hoffm. Pl. Lich. v.* 3. *t.* 70.—*Lichen erosus, Ach. Prodr.* — *L. torrefactus, Lightf.*

Frequent in rocky mountainous situations in the north of England, Wales and Scotland.

5. G. *cylíndrica,* Ach. (*fringed Gyrophora*) ; thallus coriaceous simple or many-leaved slightly wrinkled dark bluish or greenish-grey variously lobed and plaited coarsely ciliated at the margin with black branched wiry bristles, beneath smooth pale with scattered branching fibres, apothecia elevated nearly plane variously plaited. — *Ach. Syn. p.* 65. — *Lichen cylindricus, Linn. Amæn. Acad.*—*Lichen proboscideus, Linn. Sp. Pl. p.* 1617. (*according to Smith*). — *Umbilicaria crinita, Hoffm. Pl. Lich. t.* 44. — *Umbilicaria polymorpha,* α. *Schær. Lich. Helv. Spicil. p.* 87.—*Lichen crinitus, Lightf.* — *Dill. Musc. t.* 29. *f.* 116.

Abundant on mountain rocks. — This has more coriaceous *fronds* than any of the preceding, of a blue-grey colour, especially when dry, and is remarkable for the coarse black fringe with which its lobes are more or less bordered. The name of this species and of *G. proboscidea* have been most unhappily chosen. The latter appellation might with some propriety have been applied to the present species (as indeed it does appear to have been, according to Smith) ; for the bristles of the margin have a considerable resemblance (when magnified) to the proboscis, not of the Elephant, but of the Elephant Beetle (*Scarabæus Elephas*, or *S. Hercules*). It is used in Iceland occasionally as food and more frequently for dyeing woollen cloth of a brownish-green colour.

6. G. *murína,* Ach. (*mouse-skin Gyrophora*) ; frond membranous its margin plaited wavy and somewhat lobed minutely

granulated on both sides glaucous-grey above blackish-brown beneath tubercles scattered somewhat bordered much convoluted. *Ach. Meth. p.* 110. *E. Bot. t.* 2486. — *Lichen murinus, Ach. Prodr. p.* 143. — *L. griseus, Ach. in Act. Holm.* — *Umbilicaria depressa, β.* A. *Schær. Lich. Helv. Spicil. p.* 82.

"Communicated by *Mr. D. Turner* to Sir J. E. Smith, but the specimens are exotic. We know not its precise place of growth in Britain, though we have it from Sweden, Switzerland, and France.—A very distinct species, 1—2 inches broad, black, without fibres beneath, finely granulated with pale cartilaginous warts like shagreen; browner towards the edge. *Upper side* grey, very minutely cracked, without veins or plaits; white and mealy in the middle. *Tubercles* rare, minute, seldom perfectly plaited." It would be very desirable to ascertain positively whether this plant has a right to a place in the British Flora. Our specimens from France are quite different from any British species.

7. G. *pellíta*, Ach. (*fleecy Gyrophora*); thallus simple or many-leaved coriaceous sinuato-lobate dark greyish coppery-green (brown when dry) very smooth, beneath at the margin coal-black with dense pulvinate fibres, apothecia sessile at length somewhat globose most copiously and intricately plaited. *Ach. Syn. p.* 67. — *Lichen pellitus, Ach. Prodr.* — *E. Bot. t.* 931. — *L. vellus, Huds.* — *L. polyrhizus, Lightf.* — *Umbilicaria depressa, β.* F. *Schær. Lich. Helv. Spicil. p.* 83. — *Dill. Musc. t.* 30. *f.* 130.

Northern mountains, upon rocks. — The *apothecia* of this are very different from those of any other British species, and resemble the finest and most beautiful filagree-work.

25. Umbilicária. *Fée, Hoffm.* (*part of*) Umbilicaria.

Thallus foliaceous, coriaceo-membranaceous, pustuled, fixed by the centre, peltate. *Apothecia* orbicular, somewhat concave, adnate, covered by a black membrane, the *disk* at length tubercled, with a *border* of its own substance. — Name, — *Umbilicus*, from the *umbilicated* frond or thallus.

1. U. *pustuláta*. Schrad. (*blistered Umbilicaria*); thallus spreading simple covered with wart-like blisters greenish-grey (pale grey and pruinose when dry) blacker at the margin which is variously lobed and bearing copious tufts of black hairs which sometimes extend to the disk, beneath grey-brown deeply pitted naked, apothecia few plane bordered at length often tubercled. — *Schrad. Spicil. p.* 102. *Hoffm. Pl. Lich. t.* 28. *f.* 1, 2. *t.* 29. *f.* 4. — *Lecidea pustulata, Ach. Meth. p.* 85. — *Lichen pustulatus, Linn.* — *E. Bot. t.* 1283. — *Gyrophora pustulata, Ach. Syn. p.* 66. *Hook. Fl. Scot. P. II. t.* 42.

Rocks in various parts of England, Wales, Scotland and South of Ireland (*Mr. Wilson*); but not very general. — It often grows to a large size. I collected my finest specimens on dry Granite rocks in a shallow stream upon Dartmoor, Devon. Mr. Menzies has gathered the fruit in Scotland (perhaps the first of any one in Britain, where it is extremely rare), and Mr. Borrer and myself in the Isle of Skye.

B. *Upper and under-surfaces of the thallus nearly alike.*

a. *Thallus usually compressed and laciniated. Apothecia scutelliform (scutellæ).*

26. CETRÁRIA. *Ach.* Cetraria.

Thallus foliaceous, cartilagineo-membranaceous, ascending and spreading, lobed and laciniated, on each side smooth and naked. *Apothecia* orbicular, obliquely adnate with the margin of the *thallus*, the lower portion being free (not united with the *thallus*); the *disk* coloured, plano-concave, with a *border* formed of the *thallus* and inflexed. — Named from *cetra*, an ancient *buckler* made of hide, which the *apothecia* are supposed to resemble. — The species are eminently northern or alpine plants.

1. C. *juniperína*, Ach. (*golden Cetraria*); thallus pale yellow deeper beneath, the segments plane ascending erose crenate and crisped, apothecia elevated bright-bay the border crenulated. — *Ach. Syn. p.* 226. — *Lichen juniperinus, Linn.* — *β. pinastri;* thallus with the segments depressed bluntly lobed crenate the margins crisped pulverulent very yellow. *Ach. Syn. l. c.* — *Lichen pinastri, Scop.* — *Dicks.* — *E. Bot. t.* 2111. — *L. juniperinus, Lightf.*

On trunks of trees. *β.* in the north of Scotland, principally on the Scotch Fir. Frequent about Aviemore, and at Kinnordy, the seat of *Chas. Lyell, Esq.* Park pales at Framingham, near Norwich, *Mr. Turner.* — The *fructification*, though I have gathered it not unfrequently in Switzerland, has, I believe, never been found in Britain.

2. C. *sepíncola*, Ach. (*Fence Cetraria*); thallus olive-brown paler and pitted beneath the segments flattish ascending lobed waved subcrenate powdery, apothecia nearly marginal elevated chestnut-coloured with a crenate and wrinkled border. — *Ach. Syn. p.* 227. — *Lichen sepincola, Ehrh.* — *Hedw. Cr. v.* 2. *p.* 8. *t.* 2. *E. Bot. t.* 2386.

On trees, mostly Firs and Birch, Scotland, especially in the north Highlands. Kinnordy, Forfarshire. On old posts and rails by the sea, near Yarmouth, *Mr. Turner.* — The *apothecia* are very rare. — Mr. Dickson mentions this plant as growing upon stones in the Scotch mountains. I have never seen it except on wood.

3. C. *glaúca*, Ach. (*glaucous Cetraria*); thallus membranaceous smooth somewhat shining sinuated and lobed glaucous-grey above brown beneath, the segments cut and jagged curled ascending, apothecia marginal elevated chestnut-brown, their border wrinkled. — *Ach. Syn. p.* 227. — *Lichen glaucus, Linn.* — *E. Bot. t.* 1066. — *Dill. Musc. t.* 25. *f.* 46. — *β. fallax;* thallus white or glaucous on both sides or partially black beneath. *Ach. l. c.* — *C. fallax, Ach. Meth. p.* 206. — *Lichen fallax, Web.* — *Dicks. Cr. Fasc.* 1. *p.* 13. *E. Bot. t.* 2373. — *Dill. Musc. t.* 22. *f.* 58.

Heathy places on the ground, on rocks and trees; not uncommon.

β. On rocks, Devonshire, *Mr. Slater.* On the ground and on trees at Inverary. — To me the *var.* β. appears to be an old and diseased state of *C. glauca*, from which the dark epidermis beneath has fallen away, and with very old large and almost convex *apothecia*. The figures in *E. Bot.* (from foreign specimens), are more finely laciniated than I have ever seen the plant.

4. C. *nivális*, Ach. (*Snow Cetraria*); thallus pale sulphur-coloured orange at the base erect tufted nearly plane pitted and reticulated laciniated, its segments multifid crisped crenato-dentate divaricated often warted at the points, apothecia pale flesh-coloured their border crenulated. — *Ach. Syn. p.* 228. — *Lichen nivalis, Linn.* — *E. Bot. t.* 1994.

Summit of the more elevated northern mountains of Scotland; particularly abundant on the Cairngorm range. — Its flesh-coloured *apothecia*, with a wrinkled and crenulated *border*, have never been found in Britain.

5. C. *Islándica*, Ach. (*Iceland Cetraria*); thallus erect tufted olive-brown paler on one side, laciniated channelled and dentato-ciliate the fertile lacinia very broad, apothecia brown appressed flat with an elevated border. — *Ach. Syn. p.* 229. — *Lichen Islandicus, Linn.* — *E. Bot. t.* 1330. *Woodv. Med. Bot. t.* 265.

On the ground, in exposed situations on the mountains of the north, generally sparingly. Particularly abundant and bearing *apothecia* copiously on Ben-na-bord in Aberdeenshire, *Dr. Greville, Mr. Arnott and Hooker.* — Very variable in size and ramification, and somewhat in the colour. Professor Graham was perhaps the first Botanist in Britain who gathered its fructification. He met with it in Aug. 1821 (a single specimen), near the top of a mountain called Morne, immediately to the westward of Castleton in Braemar. Although the plant is abundant in certain districts of Scotland, it has never with us been collected as an article of commerce. A considerable proportion of what comes to our shops, where it is in great request as a medicine in coughs, consumptions, &c., is procured from Norway or from Iceland. Immense quantities are gathered in the latter country, not only for sale, but for their own use as an article of common food. The bitter and purgative quality being extracted by steeping in water, the *Lichen* is dried, reduced to powder, and made into a cake, or boiled and eaten with milk, and eaten with thankfulness, too, by the poor natives, who confess "that a bountiful Providence sends them bread out of the very stones."

27. Roccélla. *Ach.* Roccella.

Thallus coriaceo-cartilaginous, rounded or plane, branched or laciniated. *Apothecia* orbicular, adnate with the *thallus*; the *disk* coloured, plano-convex, with a *border* at length thickened and elevated, formed of the *thallus* and covering a sublentiform, black, compact, pulverulent powder, concealed within the substance of the thallus. — Name, supposed to be derived from the family of the person who discovered its valuable properties as a *dye*.

1. R. *tinctória*, De Cand. (*Dyer's Roccella, Rock-moss, or Archill*); thallus suffruticose rounded branched somewhat erect

greyish-brown bearing powdery warts, apothecia flat almost black and pruinose with a scarcely prominent border.—*Ach. Syn. p.* 243.—*Lichen Roccella, Linn.*—*E. Bot. t.* 211.—*Dill. Musc. t.* 17. *f.* 39.

Maritime rocks, in the extreme south of England. Guernsey, *M. Gosselin.* Portland island, *Lord Viscount Lewisham.* Abundant on the steep rocks of the Scilly islands, *Hooker.*—This interesting *Lichen* is the famous *Archill* or *Orchill; Orseille* of the French: which yields the most valuable dye of all this tribe. Its several names are derived from a Florentine family of the Oricellarii, Rucellarii, or Rucellai, one of whom, in the year 1300, carried on a considerable trade in the Levant, and, returning with great wealth to Florence, first made known in Europe the art of dyeing with this plant. Far more abundantly than with us, it is a product of warm climates, on maritime rocks in almost every part of the world and always growing mixed with the following species, which might almost lead to the suspicion that they were *varieties* of each other. The Canary islands formerly yielded this Lichen in abundance, whence it has been called *Canary weed;* but so great has been its consumption of late years, that the best quality of it, whose average price is 200*l.* the ton, has become extremely scarce: and what is commonly imported from other countries is not worth 30*l.* the ton. The English blue broad-cloths are *first* dyed with *Archill*, which gives their peculiar lustre and purple tint when viewed in a certain light. 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.

2. R. *fucifórmis*, De Cand. (*flat-leaved Archill*); thallus flat branched nearly upright greyish-white bearing powdery warts, apothecia pruinose bordered.—*Ach. Syn. p.* 244.—*Lichen fuciformis, Linn.*—*E. Bot. t.* 728.—*Dill. Musc. t.* 23. *f.* 61.

On maritime rocks, with the preceding:—from which it is distinguished by its much larger size, broader flat *fronds*, and paler colour. Its quality too, as a dye, is greatly inferior to the preceding, as Mr. Mackintosh assures me.—The *R. phycopsis* of *Ach.* seems to be only a *variety* of this, and almost intermediate between it and the preceding species.

28. Borréra. *Ach.* Borrera.

Thallus cartilaginous, branched and laciniated, the segments free, generally grooved beneath, the margins frequently ciliated. *Apothecia* orbicular, peltate, beneath formed of the *thallus;* the *disk* coloured and surrounded by the elevated inflexed *border* formed also of the *thallus.*—Named in compliment to W. Borrer, Esq. by Acharius, who with great truth terms him "*Lichenologus eximius.*" The species of which it is composed are generally plants of a southern latitude.

1. B. *ciliáris*, Ach. (*larger ciliated Borrera*); thallus spreading greyish-green minutely downy, the segments linear branched

ciliated especially towards the extremity, white and grooved beneath, apothecia elevated brownish-black and pruinose concave at length plane with a jagged border.—*Ach. Syn. p.* 22.—*Lichen ciliaris, Linn.*—*E. Bot. t.* 1352.—*Dill. Musc. t.* 20. *f.* 45.

Trunks of trees, frequent.

2. B. *tenélla*, Ach. (*lesser ciliated Borrera*); thallus spreading whitish-grey smooth, the segments linear subpinnatifid ascending dilated swollen vaulted and ciliated at the extremity, apothecia sessile black pruinose with an elevated entire border. —*Ach. Syn. p.* 221.—*Lichen tenellus, Web.*—*E. Bot. t.* 1351. *L. ciliaris, β. Huds.*—*L. hispidus, Hoffm.*—*Dill. Musc. t.* 20. *f.* 46.

3. B. *leucoméla*, Ach. (*black-haired Borrera*); thallus spreading smooth white on both sides channelled and powdery beneath, the segments linear fringed with long black very slender hairs, apothecia stalked bluish-black with a white radiating border.—*Sm.*—*Ach. Syn. p.* 222.—*Lichen leucomelos, Linn.*—*E. Bot. t.* 2548.—*Dill. Musc. t.* 21. *f.* 20.

Upon the ground among Thyme, &c., near the sea at Babbicombe and Torbay, *Hooker.*—This varies somewhat from the exotic state of *B. leucomela*, in having broader segments to the *thallus*, of a less pure white, and with more branching cilia: yet both in its appearance and place of growth, it is very different from *B. ciliaris*, to which, if I mistake not, Mr. Borrer is disposed, and perhaps correctly, to refer it. The fruit has not been detected, but is described above by Sir J. E. Smith from St. Helena specimens.

4. B. *furfurácea*, Ach. (*branny Borrera*); thallus spreading ascending greyish-green farinaceous, the segments linear attenuated much divided and forked, the margin recurved, deeply grooved rugged and almost black beneath, apothecia scattered very concave inflated red-brown with a thin inflexed border.—*Ach. Syn. p.* 222.—*Lichen furfuraceous, Linn.*—*E. Bot. t.* 984. —*Dill. Musc. t.* 21. *f.* 52.

Trunks and branches of old trees, especially when they are verging to decay, and on old pales.—This is a large and remarkably handsome species: nor are its *apothecia* of very unfrequent occurrence.

5. B. *Atlántica*, Ach. (*Atlantic Borrera*); thallus erect grey-brown downy much and intricately branched, the segments linear deeply grooved the margins revolute, apothecia scattered, the disk nearly flat blackish-brown with a thick entire border.—*Ach. Syn. p.* 1715.—*Lichen Atlanticus, E. Bot. t.* 1715.—*Lichen intricatus, Desfont. Fl. Atl. v.* 2. *p.* 420. *t.* 258. *f.* 3.—*Dill. Musc. t.* 21. *f.* 51.

On Elms, at Bracklesham in Lelsey island; and on the cliffs near Hastings, abundant. *Mr. Borrer.*—This highly interesting plant is, like *B. leucomela, B. chrysophthalma and B. flavicans*, confined to the southern and warmer parts of the kingdom, where they seem to have attained their northern limits.

6. B. *chrysophthálma*, Ach. (*golden-eyed Borrera*); thallus

erect branched tufted bright greenish-yellow alike on both sides, the segments linear multifid and fringed especially towards the extremity, apothecia copious terminal deep orange-colour with a fringed border.—*Ach. Syn. p.* 224.—*Lichen chrysophthalmus, Linn.*—*E. Bot. t.* 1088.—*Dill. Musc. t.* 13. *f.* 17.

Rare; in Devonshire, on Apple-trees. (*Mr. Sowerby.*) On Thorns near Torquay, *Hooker.* Sussex, *Mr. Borrer;* generally, if not always, growing on the family of *Rosaceæ.*—This is, in Britain, no less rare than it is beautiful. I have gathered it abundantly upon White-Thorns, by the road-side in La Vendée in France, but near the sea, where also it appears always to grow with us.

7. B. *flávicans*, Ach. (*brass-wire Borrera*); thallus erect tufted and entangled tawny warted compressed angular wavy, the branches divaricated tapering, apothecia lateral nearly sessile flat orange with a narrow entire pale border.—*Ach. Syn. p.* 224.—*Lichen flavicans, Sw.*—*E. Bot. t.* 2113.—*L. vulpinus, Huds.*—*Dill. Musc. t.* 13. *f.* 16.

On trees and shrubs, especially on fruit-trees, in Devonshire and Sussex and other parts of the south of England:—but I am not aware that the *apothecia* have been found in Britain.—Mr. Lightfoot was probably mistaken in supposing it to be a native of Scotland.

29. Evérnia. *Ach.* Evernia.

Thallus subcrustaceous, branched and laciniated, angled or compressed, cottony within ("intus stuppeus"). *Apothecia* orbicular, scutelliform, sessile; the *disk* concave, coloured, with an inflexed *border* formed of the *thallus.*—Name; εν, *well*, and ερνος, a *branch;* the species being a good deal branched.

1. E. *prunástri*, Ach. (*ragged hoary Evernia*); thallus erect greenish-white much branched pitted and rugged flat, the segments linear attenuate somewhat grooved and paler beneath, apothecia bright-brown concave elevated with an inflexed border.—*Ach. Syn. p.* 245.—*Lichen prunastri, Linn.*—*E. Bot. t.* 859.—*Dill. Musc. t.* 21. *f.* 55. A.—β. *stictoceros;* compressed pale sulphur-coloured with minute black terminal tubercles. *Lichen stictoceros, E. Bot. t.* 1353.

Trunks and branches of trees, common: the *apothecia* are unfrequent. β. On the ground upon broken sand-banks on Exmouth warren, Devonshire, *James Brodie, Esq.*—This Lichen was brought into use in Glasgow, by the late Lord Dundonald, and employed (during the war) instead of gum in calico-printing; it afterwards fell into disuse as a very inferior substitute for that article.

30. Ramalína. *Ach.* Ramalina.

Thallus cartilaginous, branched and laciniated, somewhat shrubby, generally having powdery *warts* (*soredia*), compactly cottony within. *Apothecia* orbicular, scutelliform, stipitate and peltate, plane, bordered, entirely formed of the substance of the *thallus* and nearly of the same colour. Name derived from *ramale*, a *dead branch.*

1. R. *polymórpha*, Ach. (*variable Ramalina*); thallus plane-compressed or roundish laciniato-ramose pale longitudinally lacunose, soredia scattered subelliptical terminal capituliform, apothecia submarginal rather concave the disk flesh-coloured subpruinose.—*Ach. Syn. p.* 295. *Winch, Fl. of North. p.* 92.—*Lichen polymorphus, Ach. in Act. Holm. v.* 18. *p.* 270. *t.* 11. *f.* 3.

On rocks and stones in the neighbourhood of Eglestone, Durham, *Rev. J. Harriman.*

2. R. *fraxínea*, Ach. (*Ash Ramalina*); thallus pendent flat pitted and reticulated greenish-grey glabrous much branched especially from below, the segments linear-lanceolate attenuated often jagged, apothecia large submarginal plane or convex at length rugged.—*Ach. Syn. p.* 296.—*Lichen fraxineus, Linn.*—*E. Bot. t.* 1781.—*Dill. Musc. t.* 22. *f.* 59.

Abundant on the trunks and especially the large branches of very old trees, Oak and Ash, and bearing *apothecia* copiously.—*Fronds* often 5 and 6 inches long; but variable in length and in the breadth of their segments.—This has been used in Glasgow for the same purpose as *Evernia prunastri.*

3. R. *fastigiáta*, Ach. (*fastigiate Ramalina*); thallus erect pale-green much branched and tufted rigid compressed lacunose smooth naked, the segments dilated upwards and bearing short spur-like branches, apothecia subterminal nearly sessile pale flat.—*Ach. Syn. p.* 296.—*Lichen fastigiatus, Ach. Prodr.*—*E. Bot. t.* 890.—*L. calicaris, Huds.*—*Dill. Musc. t.* 23. *f.* 62.

Trunks of trees, frequent.—A variable plant, especially in its ramification.

4. R. *scopulórum*, Ach. (*Rock Ramalina*); thallus pendent pale greenish-white compressed sublacunose somewhat polished branched, the segments linear attenuated, apothecia scattered on short stalks of the same colour as the thallus.—*Ach. Syn. p.* 297.—*Lichen scopulorum, Retz.*—*Dicks.*—*E. Bot. t.* 688.—*L. calicaris, Linn.*—*Fl. Dan. t.* 959. *f.* 2.—*L. siliquosus, Huds.*—*Dill. Musc. t.* 17. *f.* 38. (*Ach.*)

On rocks near the sea, abundant.—This appears to hold the place in northern regions that *Roccella tinctoria* does in the southern. I find it sometimes difficult to distinguish small specimens of this from *Ramalina fastigiata.* It is indeed, usually, much larger and pendent. I have gathered individuals 6—8 inches long, on the "standing stones of Stenhouse," Orkney.

5. R. *farinácea*, Ach. (*narrow mealy Ramalina*); thallus erect pale glaucous greenish-grey much branched pitted bearing copious soredia, the segments linear wavy attenuated, apothecia scattered on short stalks flat bordered buff-coloured, the border often bearing soredia.—*Ach. Syn. p.* 297.—*Lichen farinaceus, Linn.*—*E. Bot. t.* 889.—*Dill. Musc. t.* 23. *f.* 63.

Trunks and branches of trees, frequent.—The *apothecia* are rather uncommon.

6. R. *pollinária*, Ach. (*broad-leaved mealy Ramalina*); thallus somewhat leafy spreading smooth pitted greenish-grey sprinkled with powdery cracks, the lobes jagged in linear segments, apothecia nearly terminal slightly elevated buff-coloured with a greenish inflexed smooth border. *Sm.*—*Ach. Syn. p.* 298.—*Lichen pollinarius, Ach. Prodr.*—*E. Bot. t.* 1607.—*Dill. Musc. t.* 21. *f.* 57.

On old trees, posts and rails, rarely on rocks, in England. Particularly abundant in Norfolk and Suffolk, on old barn-doors, which are sometimes covered with the plant.

b. *Thallus subcylindrical, filamentous, nearly pendent.*

a. *Thallus with a central thread. Apothecia scutelliform, without a border, ciliated* (*orbillæ*).

Fam. XIV. Usneæ.

31. Usnéa. *Ach.* Usnea.

Thallus subcrustaceous, rounded, branched, generally pendulous, with a central *thread*. *Apothecia* (*orbillæ,*) orbicular, terminal, peltate, entirely formed of the substance of the *thallus* and nearly of the same colour, the circumference mostly without a *border* and (generally) ciliated. — Name; from *âchneh* or *âchnen*, in Arabic (Axneeh or Usnee, according to Dillenius,) the name of some Tree-Lichen.

1. U. *flórida*, Ach. (*flowery Usnea*); thallus nearly erect rough greenish-grey branched, the main branches bearing innumerable small horizontal nearly simple fibrous ones, apothecia plane large pale flesh-coloured bordered with long radiating fibres or cilia. — *Ach. Syn. p.* 304.—*Lichen floridus, Linn.*—*E. Bot. t.* 872.—*Dill. Musc. t.* 13. *f.* 13.

Branches of old trees, frequent in hilly and mountainous countries.

2. U. *plicáta*, Ach. (*stringy Usnea*); thallus pendulous smooth pale, branches lax much divided subfibrillose the ultimate ones capillaceous, apothecia plane broad ciliated, the cilia slender and very long.—*Ach. Syn. p.* 305.—*Lichen plicatus, Linn.*—*E. Bot. t.* 257.—*Dill. Musc. t.* 11. *f.* 1.—*β. hirta;* nearly erect greyish-green much branched scabrous bearing flesh-coloured solid warts, branches very much divided flexuose intricate subfibrillose.—*Ach. Syn. p.* 305.—*Lichen hirtus, Linn.*—*E. Bot. t.* 1354.—*L. floridus, β. Huds.*—*Dill. Musc. t.* 13. *f.* 12.

Common on old trees and park-pales, both *a.* and *β.*—The *Lichen hirtus* of Linnæus and E. Bot., Acharius has referred to the *Usnea plicata:* but to me it appears to have a nearer affinity with *U. florida*, and the distinctions between that and the present species are very unsatisfactory and I fear not much to be depended upon. Indeed the *Lichen plicatus* of E. Bot. looks more like the *U. barbata;* and Sir J. E. Smith observes that the main-stems often crack here and there, as is the case with that species: and then I do not see how they are to be distinguished.

3. U. *barbáta*, Ach. (*jointed Usnea*); thallus pendulous smoothish very much branched greenish-grey, the main stem stout articulated the branches very long slender capillary intricate sometimes bearing fleshy tubercles.—*Ach. Syn. p.* 306.—*Lichen barbatus, Linn.*—*L. articulatus, β. E. Bot. t.* 258. *f.* 2.—*Dill. Musc. t.* 12. *f.* 6.—*β. articulata;* articulations of the stem remarkably swollen.—*Ach. Syn. p.* 306.—*Lichen articulatus, Linn.*—*E. Bot. t.* 258. *f.* 1.—*Dill. Musc. t.* 11. *f.* 4.

On trees in old woods, particularly in subalpine districts. The *var.* β. I have gathered on sands at Exmouth Warren, Devon; and I possess very fine specimens from sands by the sea-side near Malahide, Ireland, sent me by *J. T. Mackay, Esq.*—No *apothecia* are described by Acharius, nor have they been ever found on British specimens. May it not be a variety of one of the preceding? or rather may not all be considered as mere forms of one species? The same and various intermediate states are found in almost all parts of the world.

β. Thallus without a central thread, sometimes slightly compressed.

Fam. XV. Cornicularieæ.

32. Alectória. *Ach.* Alectoria.

Thallus cartilaginous, subfiliform, branched, prostrate or pendulous, somewhat fistulose and cottony within. *Apothecia* orbicular, thick, sessile, plane or convex, more or less bordered, entirely formed of the thallus and of the same colour.—Name; αλεκτωρος, a *mane* or *hair*, according to Acharius, but the word will not bear such a construction, nor any that is applicable to the plant.

1. A. *jubáta*, Ach. (*wiry Alectoria, or Rock-Hair*); thallus tufted generally pendulous very much branched olive-brown smooth shining, branches filamentous slender often compressed at the axils bearing powdery whitish warts, apothecia sessile blackish with an entire margin.—*Ach. Syn. p.* 291.—*Lichen jubatus, Linn.*—*E. Bot. t.* 1880.—*Dill. Musc. t.* 12. *f.* 7.—*β. chalybeiformis;* branches shorter suberect or decumbent. *Ach. Syn. p.* 291.—*Lichen jubatus, β. E. Bot. t.* 1880, *upper figure.*—*Lichen chalybeiformis, Linn.*—*Dill. Musc. t.* 13. *f.* 10.

Trunks of trees, especially of Firs; upon rocks and old pales; abundant in subalpine countries.—*Apothecia* (if they were really such), were found by Mr. Turner and myself in the Highlands in 1807 and are figured in *E. Bot.*; they are sessile, frequently oblong, the *disk* at length cracked and rugged with age. Linnæus tells us that in winter, when the snow is very deep upon the ground, this *Lichen* supplies the Reindeer with food;—for this purpose the Laplander cuts down the trees, that the plant upon the topmost branches may be accessible to this useful animal.

2. A. *sarmentósa*, Ach. (*trailing Alectoria*); thallus procumbent somewhat compressed pale sulphur-colour pitted smooth branched the branches very much divaricated and forked the

ultimate ones short and capillary, apothecia scattered lateral sessile concave greenish flesh-colour with an entire border.—*Ach. Syn. p.* 293.—*Lichen sarmentosus, Ach. Prodr.*—*E. Bot. t.* 2040.—*Dill. Musc. t.* 11. *f.* 2.

Dry stony places on the more elevated mountains of the north of Scotland, particularly abundant on the Cairngorm range, *Borrer and Hook.*—This very distinct species, of which the fructification has never been found in Britain, creeps loosely over stones and tufts of *Azalea procumbens* and the alpine *Trichostoma*, fixing itself to them by the ends of some of its branches.

33. Corniculária. *Ach.* Cornicularia.

Thallus cartilaginous, branched, within nearly solid and cottony. *Apothecia* orbicular, terminal, obliquely peltate, entirely formed of the substance of the thallus, at length convex, more or less bordered and often toothed.—Name; *cornicula, little horns*, which its forked branches resemble.

1. C. *trístis*, Ach. (*dark radiated Cornicularia*); thallus fruticulose tufted deep pitchy-brown branched, the branches compressed roughish fastigiate and somewhat distichous, apothecia large deep-brown flattish with an entire or radiated border.—*Ach. Syn. p.* 69.—*Lichen tristis, Web.*—*E. Bot. t.* 720.—*L. radiatus, Huds.*—*Dicks.*—*L. corniculatus, Lightf.*—*Dill. Musc. t.* 17. *f.* 37.

Alpine rocks, frequent; where it forms small, rounded, very rigid tufts.

2. C. *aculeáta*, Ach. (*aculeated Cornicularia*); thallus suffruticose tufted dark-brown much branched somewhat lacunose rounded or slightly compressed smooth or toothletted, the branches divaricating intricate the ultimate ones small spinulose, apothecia with a jagged or prickly radiated margin.—*Ach. Syn. p.* 299, (*α. and β.*)—*Lobaria aculeata, Hoffm. Pl. Lich. t.* 5. *f.* 2.—*Lichen aculeatus, β.*—*Lichen hispidus, Lightf.*—*E. Bot. t.* 452.—*Cornicularia spadicea, Ach. Lich. Univ.*—*Lichen spadiceus, Roth.*

On the ground in barren heaths and on dry moors, especially in mountainous countries.—The plant is very variable in size and ramification, and Acharius has enumerated 5 *varieties*, referring the *English Botany* figure, which is very characteristic of the common fructified state of the plant, to his *var. β.*

3. C. *bícolor*, Ach. (*black and grey Cornicularia*); thallus erect rigid black much branched with numerous capillary compound attenuated very slender smooth patent wavy branches pale brown at the extremities.—*Ach. Syn. p.* 301.—*Lichen bicolor, Ehrh.*—*E. Bot. t.* 1853.

Upon dry rocks among mosses, on the higher mountains of Scotland, not unfrequent; but always barren, as it is likewise upon the Continent—The plant resembles coarse horse-hair as it grows scattered among mosses.

4. C. *ochroleúca*, Ach. (*sulphur-coloured Cornicularia*); thallus densely tufted sulphur-yellow repeatedly branched somewhat pitted and bearing powdery warts, branches divaricated the ultimate ones small with forked blackish points, apothecia concave orange-brown with an inflexed border.—*Ach. Syn. p.* 69.—*Lichen ochroleucus, Ehrh. Beitr.*—*E. Bot. t.* 2374.—*Usnea ochroleuca, Hoffm. Pl. Lich. v.* 2. *p.* 7. *t.* 26. *f.* 2. *and t.* 68. *f.* 5, 6, 7.

Highland mountains of Scotland.—I have never seen it growing except upon the Cairngorm mountains, in the same situations as *Alectoria ochroleuca*, appearing in dense erect tufts, while the latter is procumbent, straggling and creeping.—The *apothecia* I possess only upon Norwegian specimens, gathered on Settefield near Taffte in Doorefield.

5. C. *lanáta*, Ach. (*black woolly Cornicularia*); thallus decumbent spreading densely tufted smooth brownish-black of innumerable slender flexuose intricate rounded ramifications, apothecia of the same colour flat or slightly convex with a jagged border.—*Ach. Syn. p.* 846.—*Lichen lanatus, Linn.*—*Schrad. Spicil. p.* 100. *t.* 1. *f.* 6.—*E. Bot. t.* 846.—*Dill. Musc. t.* 13. *f.* 8, 9, *and t.* 17. *f.* 32.

Rocks, in mountainous situations in the north, more frequent on the highest mountains, plentiful and bearing fruit on Ben Nevis.

6. C.? *heteromálla*, (*black Plush Cornicularia*); minutely shrubby densely tufted erect entangled cylindrical corymbose black with palish notched tips.—*Lichen heteromallus, Sm. in E. Bot. t.* 2246.

In the cracks of the bark of old Elms, in Hainault forest, *Mr. Sowerby.*—"We can find no characters suitable to this plant in Acharius, to whose Genus *Cornicularia* it undoubtedly belongs. The *fronds* form wide dense black patches, from a quarter to half an inch thick, harsh and rigid, but not brittle, when dry; soft, elastic, and spongy when wet. Each is repeatedly branched, from a slender base, in a corymbose manner, upwards, so as to make a level surface at the top. The colour is a deep olive-black, rather shining, paler here and there, especially at the tips, which however are often quite black, and the whole, standing upright, are entangled laterally by their branches, so as to compose something like coarse velvet or plush. No shields are discoverable." It would probably with more propriety be referred to the *Fungi*, but I have never seen any specimen.

Obs.—The *Cornicularia pubescens* of Acharius (*Lichen pubescens, Linn. and E. Bot. t.* 2318), an inhabitant of *wet* rocks, has all the structure of *Bangia atro-virens*, Lyngbye, (*Stigonema, Agardh*): but Sir J. E. Smith has represented upon it the shields of a *Lichen*. There is, however, reason to believe that these supposed fructifications are a parasitic *Fungus*, which Capt. Carmichael has detected and described in Dr. Greville's Scottish Cryptogamia Flora (t. 186.), as *Sphæria affinis:* hence the species must be altogether expunged from this Order.

c. *Thallus shrubby, rounded, usually much branched, mostly erect.*

a. *Solid. Apothecia globose, filled with black powder (cistulæ) or solid.*

Fam. XVI. Sphærophoreæ.

34. Isídium. *Ach.* Isidium.

Thallus crustaceous, spreading, adnate, bearing solid, erect branches (or *podetia?*). *Apothecia* orbicular, convex, at length subglobose, solid, terminal upon the podetia and more or less sunk in the extremity, so as to leave a *border* of the substance of the *podetium*. — Name, Ισις, a kind of *coral*, and ειδος, *form*, from the resemblance of the podetia to some kind of coral or coralline. — The situation of this genus is very doubtful; for the majority of the ramifications are so short and so combined as almost to constitute a flattish warted crust, while the portions that bear the fructifications are considerably elongated.[1]

1. I. *lutéscens*, Turn. and Borr. (*yellowish Isidium*); thallus tartareous thin cracked into tumid areolæ greyish with a filmy zonate margin, podetia very abundant minute very short yellowish almost concealing the thallus. *Turn. and Borr. Lich. Brit. p.* 87. — *Lepraria lutescens, Ach. Meth.* — *E. Bot. t.* 1529. — *Lepra lutescens, Hoffm. Pl. Lich. p.* 100. *t.* 23. *f.* 1, 2. — *Lichen lutescens, Hoffm.* — *Isidium phymatodes, β. phragmeum, Ach. Syn. p.* 282.

Trunks of large trees, but not common; in Surrey, Sussex, Suffolk and Essex. — I have followed the able authors of *Lichenographia Brit.* in making this a species of *Isidium:* though without the fructification the plant appears to be altogether a *Lepraria*, and the *apothecia* have never been found in Britain.

2. I. *coccódes*, Ach. (*granulated Isidium*); thallus tartareous thin cracked into somewhat tumid convex areolæ greyish with a filmy zonate border, podetia abundant some scattered and some clustered in patches simple and branched of nearly the same colour as the crust, apothecia brown immarginate. *Turn. and Borr.* — *Ach. Syn. p.* 283. *Turn. and Borr. Lich. Brit. p.* 89. — *Lichen coccodes, Ach. Prodr.* — *E. Bot. t.* 1511. — *β. phymatodes;* podetia white very confluent when branched. *Turn. and Borr. l. c.* — *Isidium phymatodes, Ach. Syn. p.* 282. — *Lichen ferrugineus, Hoffm. Enum. p.* 9. *t.* 2. *f.* 3.

[1] This genus has happily been illustrated by Messrs. Turner and Borrer (whose definitions of the species I have adopted), and they give the following generic character; "*Apothecium* a solid, hardish *globule*, terminating a solid subcylindrical *papillula* (*podetium*), resembling a proper peduncle, and formed from the substance of the *thallus*, sometimes also sessile on the crustaceous part of the thallus, covered in its early stage with the epidermis of the plant, afterwards naked, but always semi-immersed, and never reflexed in its lower part."

On old rails and the bark of trees, in England. Walls of Forncet Church-yard, and bricks on the top of the steeple of Burgh Church, Suffolk, *Mr. Turner*. β. chiefly on the trunks of trees.

3. I. *Westríngii*, Ach. (*speckled Isidium*); thallus tartareous thickish cracked into tumid very rugged areolæ greyish-brown with a zonate border, podetia scattered and crowded simple and branched in a connate manner of nearly the same colour as the crust, apothecia brown immarginate. *Turn. and Borr.—Ach. Syn. p.* 282.—*Lichen Westringii, Ach. in Act. Holm. v.* 15. *p.* 179. *t.* 6. *f.* 1. *E. Bot. t.* 2204.—*L. pseudo-corallinus, Westr. in Ach. Holm.*

On rocks and stones in the north of England, Wales and Scotland, and about Dublin.

4. I. *microstícticum*, Turn. and Borr. (*small dotted Isidium*); thallus tartareous cracked into smoothish areolæ and nearly even of a brownish cream-colour becoming thinner by degrees towards the edges, podetia scattered short simple of the same colour as the crust, apothecia brownish with an imperfect margin. *Turn. and Borr. Lich. Brit. p.* 94. *Hook. Fl. Scot. P. II. p.* 66. — *Lichen microsticticus, E. Bot. t.* 2243. — *Isidium lævigatum, Ach. Syn. p.* 281.? *Lich. Univ. p.* 577. *t.* 11. *f.* 7.? — β. *album*; thallus white, podetia frequently confluent. *Turn. and Borr. l. c.*—*Lecidea papillosa, Ach. Lich. Univ.* 171. (*Sir T. Gage.*)

On slate and other rocks, in mountainous countries. Plentiful about Lough Bray, Dublin.—β. Ireland, *Sir T. Gage.*

5. I. *paradóxum*, Ach. (*dubious Isidium*); thallus tartareous thickish of a leaden-grey cracked into tumid rugged and somewhat plicate areolæ the edge indistinctly zonate, podetia scattered short simple of the same colour as the crust, apothecia brownish immarginate, large white glomeruli resembling cyathi scattered over the thallus. *Turn. and Borr. Lich. Brit. p.* 97. — *Isidium corallinum* (*a state of*), *Ach. Meth. p.* 138. *t.* 3. *f.* 7. *D. E.*—*Variolaria corallina, Ach. Lich. Univ. p.* 319. *t.* 5. *f.* 6. *Ach. Syn. p.* 133.—*Lichen dealbatus, Ach. Prodr. f.* 29.

Rocks on mountains, not uncommon in Wales and Scotland. Killarney, *Sir T. Gage*; Bantry, *Miss Hutchins*. North of England, *Mr. Thornhill*.—"This beautiful production is another of those species which place difficulties, apparently insuperable, in the way of a satisfactory arrangement of the Lichens. The *thallus* and its *podetia* so exactly resemble those of the acknowledged *Isidia*, that we dare not refuse the plant a place in this Genus, whilst the *warts* which we have described bear every character of the *cyathi* of the *Variolariæ*, and no slight resemblance also to the *apothecia* of both the *Thelotremata* and the *Urceolariæ*." *Turn. and Borr.*

6. I. *corállinum*, Ach. (*white Isidium*); thallus tartareous thin cracked into tumid rugged areolæ whitish with an indistinct zonate border, podetia very abundant densely crowded branched and anastomosing of the same colour as the thallus,

apothecia brownish with a glaucous tinge bordered. *Turn. and Borr.* — *Ach. Syn. p.* 281. *Turn. and Borr. Lich. Brit. p.* 100. — *Lichen corallinus, Linn.* — *E. Bot. t.* 1541.

On rocks and stones, chiefly in mountainous countries.

7. I. *oculátum*, Ach. Meth. (*eye-like Isidium*); thallus indeterminate filmy very thin continuous white, podetia simple and branched in a proliferous manner marked with rings as if jointed, of the same colour as the crust, apothecia disk-like flattish somewhat flocculose glaucescent bordered. *Turn. and Borr. Lich. Brit. p.* 103. — *Lichen oculatus, Dicks. Cr. Fasc.* 2. *p.* 17. *t.* 6. *f.* 3. *E. Bot. t.* 1833. — *Lecanora oculata, Ach. Syn. p.* 148. — *β.* podetia densely crowded together their surface very rugged their apices soredium-like fastigiate forming an areolate surface. *Turn. and Borr. l. c.*

Rocks and stones in Scotland, and on mosses and bare soil in the mountains. *β.* forming large patches on rocks, Cunnamara, *Mr. Mackay;* and near Bantry, Ireland, *Miss Hutchins.*

35. Sphæróphoron. *Ach.* Sphærophoron.

Thallus crustaceo-cartilaginous, branched, suffruticose, solid within. *Apothecia* (*cistulæ*) subglobose, sessile, terminal on the branches of the *thallus* and formed of it, breaking with a torn *border* and containing a pulverulent black mass collected into a ball.—Name; σφαιρα, a *globe* or *ball*, and φορος, *bearing*, — the character of its fructification.

1. S. *coralloídes*, Turn. and Borr. (*Coral-like Sphærophoron*); thallus cartilaginous shrub-like subcylindrical irregularly branched brownish, apothecia sphærical in every stage, the border of the old ones inflexed and ragged. *Turn. and Borr. Lich. Brit. p.* 110. — *α. laxum;* thallus of unequal height and thickness irregularly divided, lateral branches horizontal tufted half as thick as the main-stem. *Turn. and Borr. l. c.* — *S. coralloides, Ach. Syn. p.* 287. — *Lichen globiferus, Linn.* — *E. Bot. t.* 115. — *Dill. Musc. t.* 17. *f.* 5. — *β. cæspitosum;* thallus densely cæspitose fastigiate dichotomous with erecto-patent divisions, lateral branches none. *Turn. and Borr. l. c. p.* 111. — *Sphærophoron fragile, Ach. Syn. p.* 287. *E. Bot. t.* 2474., (*not* 114.) — *Lichen fragilis, Linn.*

Both varieties on rocks, often among mosses, sometimes on trees, in the mountainous parts of Britain. *α.* On the Sussex sand-rocks, *Mr. Borrer.* — I quite agree with Messrs. Turner and Borrer in the propriety of uniting the two species now noticed into one, to which I think might safely have been joined the following, *S. compressum.*

2. S. *compréssum*, Ach. (*compressed Sphærophoron*); thallus cartilaginous shrub-like irregularly branched compressed white, old apothecia flat with a reflexed border. *Turn. and Borr.* — *Ach. Syn. p.* 287. *Turn. and Borr. Lich. Brit. p.* 115. — *Lichen fragilis, Huds.* — *E. Bot. t.* 114. — *Dill. Musc. t.* 17. *f.* 34.

Rocks and stones, in the mountainous districts; and on the Sussex sand-rocks. *Borr.*

36. STEREOCÁULON. *Ach.* Stereocaulon.

Thallus cartilaginous or somewhat woody, branched and fruticulose. *Apothecia* turbinate, sessile, solid, plane, scarcely rising above the *border*, the *disk* at length spreading, covering the border and reflexed.—Name; στερεον, *solid*, and καυλος, a *stem*, by which character it is distinguished from some other fruticulose Lichens.

1. S. *paschále*, Ach. (*much-branched Stereocaulon*); thallus greyish branched and rough with granulated excrescences, branches crowded and very much divided, apothecia scattered and terminal at length convex conglomerate blackish-brown.—*Ach. Syn. p.* 284.—*Lichen paschalis, Linn.*—*E. Bot. t.* 282.—*Dill. Musc. t.* 17. *f.* 33.

Rocks and stones, abundant in mountainous countries.

2. S. *botryósum*, Ach. (*clustered Stereocaulon*); thallus whitish-grey somewhat naked below above very densely branched, the ultimate branchlets passing gradually into clustered granules, apothecia collected on the fertile branches minute dark-brown. *Ach. Syn. p.* 284.

Scotland, *Mr. Borrer*, who observes that it appears to be a dwarfish *var.* of *S. paschale*.

3. S. *condyloídeum*, Ach. (*deformed Stereocaulon*); thallus whitish nearly naked, the branches short crooked somewhat lobed knotted and granulose, apothecia on the lateral branches at length dilated flat subsessile and appressed red-brown. *Ach. Syn. p.* 285.

North of England, *Mr. Thornhill.* (*Borrer.*)

4. S. *Ceréolus*, Ach. Meth. (*simple-stalked Stereocaulon*); stalks (podetia?) simple erect without powdery warts rising from an uneven granulated crust. *Borr.*—*Ach. Meth. p.* 316. *t.* 7. *f.* 1. *Borr. in E. Bot. Suppl. t.* 2667.—*S. cereolinum, Ach. Syn. p.* 285.—*Lichen Cereolus, Ach. Prodr. p.* 89.

Rocks on Cader-Idris, *Rev. T. Salwey* and *T. A. Knight, Junr., Esq.* Egleston, Yorkshire, *Rev. J. Harriman.* Ben Lomond, *Mr. Cotton.*

5. S. *nánum*, Ach. (*dwarf Stereocaulon*); thallus whitish-grey very slender filiform branched, branches subfastigiate floccoso-pulverulent, apothecia lateral crowded convex black-brown. *Ach. Syn. p.* 285.—*Lichen nanus, Ach. Prodr.*—*Bæomyces paschalis*, β. *nanum, Wahl, Lapp. p.* 450.

North of England, *Rev. J. Harriman* and *Mr. Robertson.*—This and *S. botryosum* and *condyloideum* I have inserted as British on the authority of Mr. Borrer, who remarks that Wahlenberg has probably done well in uniting the present species to *S. paschale*. Indeed the latter is most variable, as all must acknowledge who have seen it in different situations upon the mountains.

β. Thallus (or podetium ?) fistulose. Apothecia hemisphærical fleshy (cephalodia).

Fam. XVII. Cladonieæ.

(*Part of*, Hoffm.—Cenomyce, *part of*, Ach.)

37. Cladónia. *Fée.* Cladonia.

Thallus (*podetium, Ach.*) somewhat shrubby, branched, rarely simple, leafy with scales, which are often evanescent, *branches* cartilaginous rigid fistulose, all attenuated and subulate, divided, fertile, generally perforated in the axils. *Apothecia* (*cephalodia*) sessile, orbicular, convex, capituliform, not bordered, fixed by the circumference, free beneath in the centre, the sides reflexed, uniform within. (*Fée*)—Name; κλαδος, a *branch;* the ramifications being often copious.—I have followed M. Fée in distinguishing those species of *Cladonia* (or *Cenomyce, Ach.*) which have subulate branches, from those whose apices are cup-shaped, but I am by no means sure that the characters are to be depended upon. The determination of the species, both of this and the following genus, are attended with the greatest difficulty, on account of their variable character; and in the present state of my knowledge I dare not venture upon introducing others than those published in *English Botany.* Much attention has been given to this genus by Delise in the *Botanicon Gallicum*, who, with Acharius, unites this and the two following genera into one, *Cenomyce*, and enumerates 53 species, besides many marked *varieties*, as natives of France; all of which are most probably natives also of Britain. He would render an acceptable service to British Botany who should undertake a monograph of the British *Cladonieæ.*

1. C. *vermiculáris*, De Cand. (*Vermicelli Cladonia*); podetia spreading horizontally pure white subulate simple or slightly branched, branches tapering at each end. *Schær. Lich. Helv. Spicil. p.* 44., *Lich. Exsicc. n.* 128.—*Cenomyce vermicularis, Ach. Syn. p.* 278.—*Lichen vermicularis, Swartz.*—*Dicks. Cr. Fasc.* 2. *p.* 23. *t.* 6. *f.* 10. *E. Bot. t.* 2029.

Not unfrequent on bare ground, on the lofty mountains of the North of England and Scotland.—This has a very remarkable appearance and is quite different from all the other species of the Genus, lying prostrate on the ground and of a pure white colour, smooth, and the surface resembling, from the shape of its branches, small worms. The *fructification* is unknown.

2. C. *unciális*, (*short perforated Cladonia*); podetia elongated smooth cylindrical pale yellowish-white dichotomous the axils much perforated, the branchlets short patent at the extremity acute and rigid.—*Cenomyce uncialis, Ach. Syn. p.* 276.—*Lichen*

uncialis, Linn.—E. Bot. t. 174.—*Cladonia stellata, a. Schær. Lich. Helv. Spicil. p.* 42., *Lich. Exsicc. n.* 82.—*Dill. Musc. t.* 16. *f.* 21.—*β. turgida;* soft turgid elongated, the branches truncate fastigiate, the sterile ones stellato-denticulate closed, fertile ones digitato-ramose perforated. *C. stellata, δ. turgida, Schær. Lich. Helv. Spicil. p.* 43., *Lich. Exsicc. n.* 84.—*Lichen turgidus, Ehrh. Cr.*—*Cladonia turgida, Hoffm.*—*Fries.*—*Cenomyce parecha, Ach. Syn. p.* 272.

On Heaths and moors, abundant. *β.* Ben Lawers and Ben Voirlich, *Dr. Greville.*—This varies considerably in size, but is tolerably constant to its other characters, and is remarkable for its stout fistulose *stems* and *branches* with large perforations in the axils, and for the short ultimate spreading acute branchlets. I quite agree with Mr. Schærer in referring the *Cenomyce parecha* of Ach. to this plant.

3. C. *rangiferína*, Hoffm. (*Rein-deer Cladonia or Rein-deer Moss*); podetia erect elongated roughish cylindrical greenish-white very much branched, the axils perforated the branches scattered often intricate divaricated the ultimate ones drooping, apothecia subglobose brown on small erect branchlets. *Schær. Lich. Helv. Spicil. p.* 37. *n.* 76—79.—*Cenomyce rangiferina, Ach. Syn. p.* 277.—*Lichen rangiferinus, Linn.—E. Bot. t.* 173. —*Dill. Musc. t.* 16. *f.* 29, 30.

Moors, heaths, and mountains, frequent.—A very variable Moss, especially in the length of the ramifications and also in colour, and an inhabitant of almost every part of the world, even of the tropics; but in the colder and arctic regions it is most abundant. The barren specimens are the most branched and tufted, with the branches very intricate. It is this, which, for the greater part of the year and especially in winter, is the support of the vast herds of rein-deer wherein consists all the wealth of the Laplanders. No vegetable, Linnæus tells us, grows throughout Lapland in such abundance as this, especially in woods of scattered pines, where, for very many miles together, the surface of the sterile soil is covered with it as with snow. On the destruction of forests by fire, when no other plant will find nutriment, this Lichen springs up and flourishes, and, after a few years, acquires its full size. Here the rein-deer are pastured; and, whatever may be the depth of snow during the long winters of that climate, these creatures have the power of penetrating it and obtaining their necessary food. Linnæus has given a beautiful description of this *Lichen*, and of the animals, whose support it is, in the *Flora Lapponica, p.* 332., but it is too long for insertion in this place.

4. C. *púngens*, Delise, (*pointed Cladonia*); podetia tubular grey forked much branched without axillary perforations, branched twisted and entangled taper-pointed, apothecia minute terminal solitary brownish-black. *Sm.*—*Lichen pungens, Ach. Prodr.*—*E. Bot. t.* 2444.—*Cenomyce rangiferina, δ. Ach. Syn. p.* 277.—*Lichen uncialis, β. Lightf. p.* 880.?

Esher Common, Surrey, *Mr. Borrer.*—"It comes very near *C. uncialis*, but is said to want the axillary perforations. We find, however, not very unfrequently, lateral fissures below the origin of the clustered branches, but these are indeed different from the round central openings

of the *C. uncialis*. The *branches* too are more twisted and zigzag; Acharius says they also are more brittle. The colour is a greenish-grey. The numerous, sharp, tapering, upright branches are tipped with brownish-black; of which colour also are the small solitary round *apothecia* found at the extremities of some of them." *Sm.*

5. C. *furcáta*, Hoffm. (*forked Cladonia*); podetia elongated smooth (or leafy, especially at the base) livid or brownish-grey dichotomous the axils without perforations, branches very slender curved with the apices forked and divergent, apothecia brown.—*Cenomyce furcata, Ach. Syn. p.* 276.—*Lichen furcatus, Huds. Angl. p.* 458.—*Cladonia fruticosa, δ. Schær. Lich. Helv. Spicil. p.* 451., *Lich. Exsicc. n.* 81.—*Dill. Musc. t.* 16. *f.* 27.—A. (*young*) *B. C.* (*old*) *according to Schærer.*—*β. subulata;* podetia elongated glabrous pale dichotomous the axils perforated and open, the apices of the branches patent short rigid. *Cenomyce furcata, β. Ach. Syn. p.* 276.—*Cladonia fruticosa, γ. Schær. Lich. Helv. Spicil. p.* 40.—*Lichen subulatus, Linn.*—*Dill. Musc. t.* 16. *f.* 26. A. (*sterile*) *B. C.* (*fertile*) *according to Schærer.*—*γ. spinosa;* podetia elongated smooth at length scaly whitish-green at length inflated curved branched, branches lax subsecund the apices divergent spinulose, apothecia pale-brown. *Cenomyce racemosa, Ach. Syn. p.* 275. *Hook. Fl. Scot. P. II. p.* 64.—*Lichen spinosus, Huds.*—*Lightf.*—*Cladonia furcata, var. recurva, Hoffm.*—*C. furcata, β. recurva, Schær. Lich. Helv. Spicil. p.* 40.—*Dill. Musc. t.* 16. *f.* 25. *Ach.*

On the ground in healthy and bushy places, frequent.

38. Scyphóphorus. *Fée. De Cand.*, (part of). Cup-Lichen.

Thallus foliaceous, imbricated. Podetia fistulose, cylindrical, dilated upwards, bearing cups, or attenuated and subulate: *cups* closed with a membrane or cleft at the extremity, often rayed in a somewhat digitated manner, the rays all fertile. *Apothecia* (*cephalodia*) convex, capituliform, not bordered, free in the centre beneath, arranged around the edges of the cup, the margin reflexed, uniform within. *Fée.*—Name; σκυφος, a *cup* and φερω, to *bear*, admirably expressive of the fruit-bearing portions of this Genus of *Lichens*, of which the *Lichen pyxidatus* of Linnæus may be considered the type.—There being a distinct foliaceous spreading thallus, M. Fée considers the stalks as more essentially belonging to the fructification and more truly deserving the name of *podetia* than the same part in *Cladonia:* but the last species of *Cladonia*, (*C. furcata*), has often a small spreading *thallus*, and in this particular connects the two genera.

* *Apothecia brown.*

1. S. *cæspitítius*, (*green leafy Cup-Lichen*); thallus clustered ascending leafy pinnatifid cut and crisped bright-green above white beneath, podetia from the disk of the leaf fleshy (?) dilated

upwards short, apothecia convex reddish-brown (depressed in the centre).—*Cenomyce cæspititia, Ach. Syn. p.* 249.—*Bæomyces cæspititius, Pers. in Ust. Ann.* 7. *p.* 155.—*Tubercularia fusca, Hoffm. Pl. Lich. t.* 8. *f.* 4. ?—*Lichen cæspititius, E. Bot. t.* 1796.

On the mossy trunk of an aged oak in the New Forest, Hants, *C. Lyell, Esq.*—"The *fronds* (or *thalli*) form broad patches among moss, upon the ground or on the decayed trunks of trees, and are upright or ascending, clustered, but not very closely crowded, ¼—½ an inch high, each spreading from a tapering tubular base into a sort of cornucopiæ form, dilated upwards, pinnatifid, jagged, crisped and spreading at the extremities; the upper surface concave, of a bright pea-green; the under convex, and, as well as the crisped edges, white. *Tubercles* one or more from the central part of each leaf, convex, often umbilicated, of a light red-brown, on shortish tubular pale stalks, one of which sometimes bears several tubercles. Small dark-brown sessile *warts* also occur on the disk of the leaves. This species is one of those nearly allied to the *Cup-Lichens*, both in the fronds and tubercles, but which do not bear cups." *Sm.*

2. S. *parasíticus* (*delicate Cup-Lichen*); thallus of minute foliaceous lobed and crenate scales glaucous-green, podetia somewhat fleshy scaly simple or branched dilated upwards and bearing a cluster of pale-brown (when dry almost black) apothecia.—*Cladonia parasitica, Schær. Lich. Helv. Spicil. p.* 37., *Lich. Exsicc. n.*75.—*Lichen parasiticus, Hoffm. Enum. Lich. t.* 8. *f.* 5.—*Cenomyce delicata, Ach. Syn. p.* 274.—*Lichen delicatus, Ehrh.—E. Bot. t.* 2025.

On rotten rails in St. Leonard's forest, Sussex, *Mr. Borrer*. On the decayed trunk of a tree at Barham, Suffolk, *Hooker*. On an old wall, Appin, *Capt. Carmichael*.—This is a small species and apparently of rare occurrence.—Mr. Schærer informs us that Acharius, in his MSS., after the publication of the "*Synopsis*," enumerated this among the species of *Stereocaulon*. This and the preceding and following species differ from the rest of the *Scyphophori*, in having fleshy *podetia:* and might almost rank with *Bæomyces*, where two of them are placed in Loudon's *Hortus Britannicus*.

3. S. *microphýllus* (*small-leaved Cup-Lichen*); thallus of minute somewhat imbricated rounded nearly entire scales, podetia simple tubular quite smooth and naked (fleshy), apothecia solitary capitate convex brown somewhat lobed.—*Lichen microphyllus, Sm. in E. Bot. t.* 1782.—"*Bæomyces microphyllus, Ach. MSS.*

Wet heathy places in Filgate and St. Leonard's forests, Sussex; in the winter, but not frequent, *Mr. Borrer*.

4. S. *sparássus* (*torn-coated Cup-Lichen*); thallus of cartilaginous minute lobed and cut scales, podetia cylindrical repeatedly branched rigid ash-coloured rough with innumerable scaly leaflets, cups minute toothed pervious repeatedly proliferous from their margin, apothecia clustered brown. *Sm.—Cenomyce sparassa, Ach. Syn. p.* 273.—*Lichen sparassus, E. Bot. t.* 2362. —*Cladonia ventricosa, Schær. Lich. Helv. Spicil. p.* 30., *Lich.*

Exsicc. n. 72—74.—*Lichen ventricosus, Lightf.*—*Dill. Musc. t.* 15. *f.* 17?

Woods at Hafod, Cardiganshire, *Sir J. E. Smith.* Decayed stumps of old trees, Scotland, *Lightf.* Appin, *Capt. Carmichael.*—*Podetia* 2—3 inches high, very leafy.

5. S. *alcicórnis* (*Elk's-horn Cup-Lichen*); thallus foliaceous very pale green, the segments subpalmated ascending repando-dentate obtuse inflexed with marginal tufts of hairs, podetia elongato-turbinate all cup-bearing smooth (leafy, *Sm.*), the cups regular crenate their margin at length leafy and proliferous, apothecia brown.—*Cenomyce alcicornis, Ach. Syn. p.* 250.—*Lichen alcicornis, Lightf.*—*E. Bot. t.* 1392.—*L. foliaceus, Huds.*—*Dill. Musc. t.* 14. *f.* 12.

Heaths in mountainous countries and among rocks.—The *cups* often rise, one above another, in a proliferous manner.

6. S. *anomæ'us* (*confused brown-headed Cup-Lichen*); thallus cartilaginous brittle ash-coloured of numerous imbricated minute scales, podetia cylindrical rough and very leafy, cups turbinate closed at length dilated and radiated, apothecia marginal sessile or stalked brownish-black. *Sm.*—*Bæomyces anomæus, Ach. Meth.*—*Lichen anomæus, E. Bot. t.* 1867.—*Cenomyce gonorega,* c. *Ach. Syn. p.* 259.—*Dill. Musc. t.* 15. *f.* 20.

Woolwich heath; and on the Pentland hills, near Edinburgh, *Sir J. E. Smith.* On a barn at Lakenham, *Mr. Turner.*—Sir J. E. Smith seems inclined to refer this to *S. alcicornis.*

7. S. *endivifólius* (*Endive-leaved Cup-Lichen*); thallus spreading leafy cartilaginous deeply lobed the segments forked and pinnatifid flattish slightly twisted yellowish-green above, white beneath, podetia from the upper-side cup-bearing mostly simple, apothecia marginal reddish-brown. *Sm.*—*Cenomyce endivifolia, Ach. Syn. p.* 250.—*Lichen endivifolius, Dicks. Cr. Fasc.* 3. *p.* 17. *Hort. Sicc. Fasc.* 9. *n.* 24. *E. Bot. t.* 2361.

Dry heathy places in Scotland and Surrey, *Mr. Dickson.* Very fine on sand-hills at Hemsby, near Yarmouth, Norfolk, *Mr. Turner.*—This has the most ample foliaceous *fronds* of any *Scyphophorus,* of a singularly yellow-green colour, white beneath. Still some states of it are very nearly allied to the following, as both are to *S. alcicornis.*

8. S. *cervicórnis* (*Buck's-horn Cup-Lichen*); thallus cartilaginous nearly upright pinnatifid with oblong glaucous segments pale beneath, podetia from the disk, the thallus cup-bearing upwards at length proliferous, apothecia numerous marginal sessile blackish.—*Cenomyce cervicornis, Ach. Syn. t.* 251.—*Cladonia verticillata, Schær. Lich. Helv. Spicil. p.* 31.—*Lich. Exsicc. p.* 62.—*Lichen cervicornis, Ach. Prodr.*—*E. Bot. t.* 2574.

Moist rocks in the mountains.

9. S. *pyxidátus* (*common Cup-Lichen*); thallus foliaceous the segments crenulated ascending, podetia all turbinate elongated cup-bearing at length granulated warty rough greyish-green,

cups regular the margin at length proliferous, apothecia brown. — *Cenomyce pyxidata, Ach. Syn. p.* 252.— *Cladonia pyxidata, Schær. Lich. Helv. Spicil. p.* 26., *Lich. Exsicc. n.* 51—61.— *Lichen pyxidatus, Linn.*— *E. Bot. t.* 1393.— *Dill. Musc. t.* 14. *f.* 6.

Heathy places, on moors and in dry woods, frequent.—Formerly employed as a remedy for the whooping-cough.

10. S. *fimbriátus* (*fringed Cup-Lichen*); thallus cartilaginous lobed and crenate, podetia cylindrical white dilated at the summit into an impervious cup fringed with acute teeth and which are tipped with small brown tubercles. *Sm.*— *Cenomyce fimbriata, Ach. Syn. p.* 254.— *Lichen fimbriatus, Linn.*— *E. Bot. t.* 2438.— *L. pyxidatus, β. Huds.*— *Dill. Musc. t.* 14. *f.* 8.

Moors and heaths.

11. S. *radiátus* (*radiated Cup-Lichen*); thallus somewhat cartilaginous greenish-white, apothecia elongated slender powdery, cups irregularly radiated their points tipped with small acute reddish (brown) apothecia. *Sm.*— *Cenomyce radiata, Ach. Lich. Univ.*— *C. fimbriata,* b. *Ach. Syn. p.* 255.— *Cladonia radiata, Hoffm.*— *Lichen radiatus, Schreb.*— *E. Bot. t.* 1835.— *L. pyxidatus, ρ. Huds.*— *Dill. Musc. t.* 15. *f.* 16.

On the ground, in heathy places.

12. S. *cornútus,* (*horned Cup-Lichen*); thallus cartilaginous greyish greenish-white with numerous awl-shaped barren branches, podetia cylindrical (scarcely dilated upwards or cup-bearing) with scarlet (brown) apothecia. *Sm.*— *Cenomyce cornuta, Ach. Lich. Univ.*— *C. fimbriata,* L. *Ach. Syn. p.* 257.— *Lichen cornutus, Linn.*— *E. Bot. t.* 1836.— *L. pyxidatus, λ. Huds.*— *Dill. Musc. t.* 15. *f.* 14. *A. C. F.*

Woody or heathy, and especially mountainous places.

13. S. *grácilis* (*slender Cup-Lichen*); thallus minute (scarcely any), podetia long slender smooth cartilaginous greenish-brown at length somewhat branched, cups (ob-) conical sharply toothed, apothecia brown. *Sm.*— *Cladonia gracilis, Hoffm.*— *Schær. Lich. Helv. Spicil. p.* 32., *Lich. Exsicc. n.* 64—69.— *Cenomyce ecmocyna,* a. *Ach. Syn. p.* 261.— *Lichen gracilis, Linn.*— *E. Bot. t.* 1284.— *Dill. Musc. t.* 14. *f.* 13.

Mountainous, heathy or dry, woody places.— *Podetia* 3—4 inches long; *cups* often proliferous. "To determine the species among the cup-bearing Lichens is one of the most difficult problems in Botany. Mr. Hudson cuts the gordian knot at once by uniting them all into one; but surely nothing can be more rash. On the other hand, it may perhaps be allowed that other Botanists have subdivided them beyond the limits of Nature. If any of them be distinct species, the individual now under consideration is one." *Sm.*

** *Apothecia scarlet or deep-red.*

14. S. *filifórmis* (*thread-shaped Cup-Lichen*); thallus cartilaginous greenish-white the lobes or scales imbricated sinuated

and crenate, podetia cylindrical simple scaly, cups cylindrical (scarcely dilated) bordered with minute scarlet apothecia. *Sm.* —*Cladonia filiformis, Schær. Lich. Helv. Spicil. p.* 19.—*Lichen filiformis, Huds.*—*Ach. Prodr.*—*E. Bot. t.* 2028.—*Cenomyce bacillaris, Ach. Syn. p.* 266.—*Lichen tubiformis, Lightf.*—*L. macilentus, Ehrh.*—*Dill. Musc. t.* 14. *f.* 10.

New Forest, Hants, *C. Lyell, Esq.* Mountainous turfy heaths.—M. Schærer has referred, without any doubt, the *Lichen rubiformis* of *E. Bot. t.* 2112., the *Psora? rubiformis* of this work, to the present plant, making it his var. H.: but his specimen (*Lich. Exsicc. n.* 37.) is very different from the E. Bot. figure, and no doubt is correctly referred to the present species: and it is, further, the plant of Acharius, to whom M. Schærer sent his specimen, and received the following remark upon it: "*Biatora rubiformis, Ach. MS.*—*Lecidea rubiformis, Ach. Syn. et Lich. Univ.*, sed forma *Cenomycidis cæspititii* ibm. quæ infantilis *Cenom. symphocarpa.*"

15. S. *defórmis* (*clumsy indented Cup-Lichen*); thallus leathery pale yellowish-grey the scales roundly lobed, podetia tubular thick mostly simple, cups small irregular sharply toothed, apothecia scarlet minute. *Sm.*—*Cenomyce deformis, Ach. Syn. p.* 268.—*Cladonia deformis, Schær. Lich. Helv. Spicil. p.* 23., *Lich. Exsicc. n.* 47.—*Lichen deformis, Linn.*—*E. Bot. t.* 1394.—*L. pyxidatus, μ. Huds.*—*Dill. Musc. t.* 15. *f.* 18.

About the roots of old trees, and in woods, *Lightf.*—On heaths, Appin, *Capt. Carmichael.*—This is of a thick and clumsy form and of a singularly pale yellowish colour.

16. S. *digitátus* (*fingered Cup-Lichen*); thallus pale-grey mealy the scales minute lobed and crenated, podetia subdivided digitate and radiating imperfectly cup-bearing, apothecia terminal deep scarlet. *Sm.*—*Cenomyce digitata, Ach. Syn. p.* 267. —*Cladonia digitata, Schær. Lich. Helv. p.* 22., *Lich. Exsicc. n.* 43—45.—*Lichen digitatus, Linn.*—*E. Bot. t.* 2439.—*L. pyxidatus, ξ. Huds.*—*Dill. Musc. t.* 15. *f.* 19.

In woods, at the roots of old trees and on barren heaths.

17. S. *coccíferus* (*scarlet Cup-Lichen*); thallus leathery pale greenish-grey mealy the scales minute lobed and crenated, podetia elongated turbinate mealy all cup-bearing, cups with their margins often radiated bearing the scarlet apothecia.—*Cenomyce coccifera, Ach. Syn. p.* 269.—*Cladonia coccifera, Schær. Lich. Helv. Spicil. p.* 34., *Lich. Exsicc. n.* 50.—*Lichen cocciferus, Linn.*—*E. Bot. t.* 2051.—*L. pyxidatus, ι. Huds.*—*β. cornucopioides;* margins proliferous. *L. cornucopioides, Lightf.*

Heathy moors, abundant.

18. S. *bellidiflórus* (*daisy-flowered Cup-Lichen*); thallus foliaceous pale-green of imbricated crenated lobes or scales, podetia elongated cylindrical club-shaped rigid glaucous mostly simple foliaceo-squamose, cups narrow their margins fertile and proliferous, apothecia scarlet crowded.—*Cenomyce bellidiflora, Ach. Syn. p.* 270.—*Cladonia bellidiflora, Schær. Lich. Helv.*

Spicil. p. 21., *Lich. Exsicc. n.* 39—42. — *Lichen bellidiflorus, Ach. Prodr.* — *E. Bot. t.* 1894.

Frequent on the Highland mountains of Scotland. — The largest and most beautiful of the Genus.

39. Pycnothélia. *Dufour.* Pycnothelia.

Thallus subcrustaceous, uniform; *podetia* mostly simple, short hollow. *Apothecia* (*cephalodia*) orbicular, not bordered, capituliform, thickened, inflated beneath, terminal, reflexed at the margin, uniform within. — Name; πυκνος, *compact, crowded*, and θηλη, a small *breast*, which its fructification resembles, while the *thallus* is dense and crowded. — I am far from being satisfied with the character of this Genus; yet there is something in its habit so different from the other *Cladonieæ*, that I do not well see how it can be united either with *Cladonia* or *Scyphophorus*.

1. P. *Papillária* (*papillary Pycnothelia*); thallus subcrustaceous uniform greyish-green granulated, podetia erect ventricose smooth whitish simple or rarely divided, apothecia terminal solitary globose brown. — *Cenomyce Papillaria, Ach. Syn. p.* 248. — *Cladonia Papill. Hoffm.* — *Lichen Papillaria, Ehrh.* — *E. Bot. t.* 907. — *Dill. Musc. t.* 16. *f.* 28.

Dry exposed heaths and moors, in England and Scotland. Appin, *Capt. Carmichael.*

CHARACEÆ.

Ord. V. Characeæ. *Rich.*

Aquatic *Plants*, always submerged, composed of simple or compound, membranaceous, sometimes brittle tubes, smooth or spirally striated, often invested with a calcareous covering, jointed at the insertion of the branches, which are dichotomous and whorled. Organs of *fructification* of two kinds, on the same or on different plants; in the latter case approximate or remote from each other, always produced on, or at the base of, the lesser ramuli or bracteæ:—1. *Globules* of a reddish or orange colour (*stamens* of many authors), in maturity formed of triangular scales, each of which in *Chara vulgaris*, "has a vacant portion in its centre, but the margin (which has a fluted appearance under a small magnifier) consists of a number of parallel, linear-oblong, hyaline, hollow tubes, placed at small intervals from each other, those forming the angles of the scale being branched. Within these tubes are a profusion of globular, minute, orange bodies, (exactly similar to the sporules of many cryptogamic plants,) arranged in no order, and escaping on the least injury of the tubes. It is these little bodies which give the orange colour to the globule." (*Grev.*) The globule is filled with a mucilage and extremely delicate convoluted filaments, arising from minute campanulate bodies, often articulated:—2. *Nucules*, which are ovate, consisting of a hard, spirally twisted, crustaceous integument, often crowned with 5 projecting points, filled with minute granules; which, however, perhaps, in maturity constitute but one body, for M. Vaucher[1] has clearly ascertained (and in-

[1] "If," says this acute naturalist, "we place the ripe capsules (*nucules*) of *Chara* in water in the autumn, they will survive the winter without undergoing any perceptible alteration; but on the approach of warm weather, towards the end of April, from the upper extremity, between the five valves or points, will be seen a little prolongation, which, as it becomes more and more developed, soon gives origin to the first whorl of branches, these to a second; below these branches, the stem swells, and there appear some tufts of small roots; the capsule rests for a long time adherent to the base of the stem, even till the latter begins to bear fructification. During this development no trace of cotyledons is seen." Thus, if looked upon in the light of a capsule, this body, though in an early stage containing many minute granules, can only be considered as *monospermous*.

deed has favoured me with specimens in proof of the correctness of his observations,) that, in germination, these *nucules* give birth only to one plant.

The Genus *Chara*, of which alone this Natural Order consists, has been an object of peculiar attention with many botanists, and I regret that the limits of these pages will not allow of their investigations being here detailed. One of its most remarkable characteristics resides in the peculiar nature of its organs of fructification or reproduction. These being constantly of 2 kinds, sometimes standing near, at other times apart from each other, the greater number of Botanists of the Linnæan school have looked upon them, the one as the *stamen*, and the other as the *pistil*, and hence have placed the Genus either in MONANDRIA MONOGYNIA, or in MONŒCIA MONANDRIA. But the whole habit of the plant is so totally at variance with any of the phænogamic tribe, that even Linnæus himself, at first, placed it in CRYPTOGAMIA. And such seems to be the prevalent opinion with the followers of the natural method; although we have the high authority of Mr. Brown for arranging *Chara* among the *Hydrocharideæ* in the *Monocotyledones*, and that of Leman with the *Elodeæ* (near *Onagrariæ*) in the *Dicotyledones*. Richard first proposed that it should constitute a separate order; widely removed as it is from every other: so much so, that it would be difficult to say to which it is most allied. Dubis and De Candolle have placed it next to the *Equisetaceæ*, but with a note of doubt as to the propriety of so doing. Mr. Lindley ranges it with his *Muscoideæ*, but I think unnaturally. Agardh has made of it a subdivision of *Confervoideæ* among his *Algæ*, and there (or still better perhaps near his Genus *Valonia* in *Ulvaceæ*, if the nature of its fronds or stems and branches were alone considered), it would perhaps most conveniently rank; but the fructification is widely different, and equally remote from every other order. It is, then, for the sake of its affinity with some of the *Algæ* that I have placed it next to that family, and because it is an aquatic. I have inserted it before, rather than after them, on account of the more complicated nature of its organs of reproduction.

The calcareous matter, with which several *Charæ* are invested, is considered by many to arise from that substance being held in solution by the water in which they grow. This idea is controverted by Dr. Brewster, who found "while examining the distribution of the aggregated groupes of the carbonate of lime which forms a great portion of these plants, and which is an essential and integral part of their constitution, that the plants were phosphorescent when laid upon heated iron, so as to display their entire outlines in the dark:—also that each groupe or mass of the calcareous matter (which is held to the stem of the plant by a very fine transparent membrane), consisted of minute aggre-

gated particles, which possessed double refraction, and had regular and depolarizing axes."[1]

In those species of *Chara* which are destitute of the calcareous incrustation, and even in those which possess it, when that covering is removed, the movement of the sap has been distinctly observed and brought into notice by Professor Amici of Modena. Each joint or distinct tube has its own peculiar circulation, and the movement was ascertained in *C. vulgaris* to be at the rate of 2 lines per minute. M. Blainville witnessed the phenomenon with Professor Amici, and observes that the microscope brought to view a movement of 2 liquid currents, the one ascending and the other descending, circulating in the same tube, without being separated by any partition which could insulate them. The reality of this was placed beyond a doubt by the distinct passage of certain molecules of one of the currents, which, being attracted by the one which moved in the opposite direction, were occasionally dragged along with it.[2]

Notwithstanding the minute size of the nucules of the Genus *Chara*, they occur in a fossil state both in the marle deposits in the lakes of Forfarshire, and in the chalk of Montmartre, where they are known by the name of *Gyrogonites*, and were long considered by naturalists to belong to some extinct testaceous animals. In the first-mentioned situations, the same species (*C. hispida*) has been found also to exist very abundantly in a recent state in the water which covers the beds of calcareous marle that include the fossil nucules.

Professor Agardh has divided the Genus into *Nitella* and *Chara*, characterizing the former by its having a single, jointed tube, composed of a very thin colourless membrane, resembling that of his Genus *Valonia*, the *globules* and *nucules* separated, destitute of bracteas, and with scarcely any perceptible prominences or points crowning the nucules: — whilst, in *Chara*, the principal tube is covered by several lesser tubes (except in the part which is buried in the mud and in the extremities of the branches), the *globules* and *nucules* are placed near each other, supported by many bracteæ, and the *nucules* are crowned with distinct teeth. But the character derived from the simple or compound stems is of extremely difficult investigation, and that deduced from the situation of the organs of reproduction does not appear to be constant.

Species of *Chara*, scarcely differing from those of Europe, I have received from almost every part of the world; from Iceland in the north (where they sometimes grow in the hot springs) to the tropics, and in both hemispheres. They are found carpetting the bottoms of ditches, and stagnant waters, and frequently yielding a very disagreeable odour. Trout and

[1] Ed. Phil. Journ. v. 9. p. 194. [2] Brewster's Ed. Journ. 1827, p. 384.

Carp are said to arrive at a great size where these plants abound, feeding perhaps on their fruit, and, more greedily, on the insects which they necessarily harbour.

1. CHÁRA. Vaill.

(CHARACTER *the same as that of the Order.*)—Name; its origin unknown.

* *More or less pellucid and flexible, not striated.* (Nitella. *Ag.*)

1. C. *translúcens*, Pers. (*translucent Chara*); elongated smooth flaccid glossy and pellucid, branches of the whorls elongated patent obtuse simple with a short point, nucules and globules upon the smaller ramuli scarcely bracteated.—*Pers. Syn. Pl. v.* 2. *p.* 531. *E. Bot. t.* 1703. *E. Fl. v.* 1. *p.* 8.—*Nitella translucens, Ag. Syst. Alg. p.* 124.

Deep stagnant pools near Shrewsbury; Browston, Suffolk; Bagnley moor, Cheshire, *Mr. Wilson*. Several places in Scotland.—This is the largest, the brightest coloured and most glossy of any of our species. Vaillant and Sir Jas. E. Smith describe the branches as jointed; but this appearance is, I think, wholly owing to a fold in the membrane of the tube, which is sometimes transverse and sometimes oblique.

2. C. *fléxilis*, Linn. (*flaccid Chara*); smooth flaccid somewhat glossy and pellucid much and frequently dichotomous, branches of the whorls simple or divided obtuse, nucules few, scarcely bracteated.—*E. Bot. t.* 1070. *E. Fl. v.* 1. *p.* 7.—*Nitella flexilis*, and *opaca, Ag. Syst. Alg. p.* 124.

Ditches, lakes, and still waters, frequent.—Professor Agardh's *Nitella opaca*, according to specimens I have received from him, only differs from the true *flexilis* in having a partial incrustation and hence being more opaque. Mr. W. H. Harvey finds a variety in the lake of Killarney near Mucruss, with the branches of the whorls more elongated than usual, and fertile ramuli nestled among them. Mr. Borrer observes the nucules and globules to be intermixed and clustered.

3. C. *nidífica*, Œd. (*clustered Chara*); smooth flaccid somewhat glossy and pellucid simple below, primary whorled branches simple elongated, fertile ones very numerous crowded and proliferous, nucules separated from the globules on the same plant (*Borrer*) bracteated.—*Fl. Dan. t.* 761. *E. Bot. t.* 1703. *E. Fl. v.* 1. p. 8.—*Nitella nidifica, Ag. Syst. Alg. p.* 125.

In salt-water ditches at Shoreham, Sussex, and Cley, Norfolk, *Mr. Borrer*.—This is a stouter plant than *C. flexilis* and more slender than *C. translucens;* distinguished from both, chiefly, as far as I can discover, by the densely crowded and proliferous fertile whorls of branches. Mr. Borrer observes that it is monœcious. Smith says that in the individuals he received from Shoreham no nucules could be found, and in those from Cley the globule was stalked; in some specimens the globule accompanied the nucule.

4. C. *grácilis*, Sm. (*slender Chara*); smooth transparent shining, whorled branches acute repeatedly forked often fertile

as well as the axillary compound ones, bracteas none.—*E. Bot. t.* 2140. *E. Fl. v.* 1. *p.* 9.—*Nitella gracilis, Ag. Syst. Alg. p.* 125.

Fish-ponds in Jersey, *Sherard.* Boggy pools in St. Leonard's forest, Sussex, *Mr. Borrer.* Llyn Idwel, N. Wales, *Mr. W. Wilson.*—My specimens of this from Mr. Borrer, corresponding with those figured in E. Bot., do appear, at first sight, distinct from *C. flexilis.* They are small, delicate, pale coloured and very glossy. But I have other individuals from the same acute Botanist marked "*C. gracilis* as to ramification, not as to size," which I cannot distinguish from *C. flexilis.* Mr. Wilson's specimens are intermediate, but more allied to the E. Bot. figure. Sir J. E. Smith observes that the nucules and globules are usually together: Mr. Wilson finds them always in Llyn Idwel on different plants.

** *Opaque and very brittle, striated, often spirally.* (Chara *Ag.*)

5. C. *vulgáris*, Linn. (*common Chara*); smooth opaque brittle (but not incrusted) very obscurely striated, branches of the whorls slender subulate, fertile ones with many short ramuli or bracteæ 3 or 4 of which are much longer than the globule and nucule that they accompany.—*E. Bot. t.* 336. *E. Fl. v.* 1. *p.* 6. *Ag. Syst. Alg. p.* 128.

Ditches and slow streams, frequent.

6. C. *Hedwígii*, Ag. (*Hedwigian Chara*); elongated smooth opaque brittle (sometimes partially incrusted) obscurely striated, branches of the whorls subulate, the fertile ones with many short ramuli or bracteæ 3 or 4 of which are shorter than the nucule and globule that they accompany.—*Ag. Syst. Alg. p.* 129.—*C. pulchella, Wallr. Ann. Bot. p.* 184. *t.* 12. *Ag. Syst. Alg. p.* 129.

Still pools; Buxtead, Sussex, *Mr. Borrer.* Near Croft, Yorkshire, *Rev. J. Dalton.*—Larger than the preceding, with more numerous fertile branches and shorter bracteæ. The branches are jointed in both at the setting on of the ramuli or bracteæ, which, being numerous, the joints are consequently numerous.

7. C. *áspera*, Willd. (*rough Chara*); slender opaque brittle obscurely striated every where beset with patent scattered spinules, branches of the whorls subulate, the fertile ones with many short ramuli or bracteæ of which 3 or 4 accompany the nucule or globule (on different plants) uncertain in length.—*Wallr. Ann. Bot. p.* 185. *t.* 6. *f.* 3. *Ag. Syst. Alg. p.* 130. *Grev. Scot. Cr. Fl. t.* 339.—*Wils. E. Bot. Suppl. t.* 2738.—*C. galioides, De Cand.* (*according to specimens from the author*).

Pools of fresh water, Orkney, *Mr. C. Clauston.* Brestwick Carr, Northumberland, *Mr. W. Robertson.* Irthing, Durham, *Mr. Bowman.* Peat-pits in Cleiviog Farm, 4 miles from Holyhead, *Mr. W. Wilson.*—In one of my specimens, from Montpellier, I find the globules on the same plant with the nucules, but apart from them.

8. C. *híspida*, Linn. (*hispid Chara*); opaque brittle striated covered more or less thickly by a calcareous crust, branches

of the whorls subulate, fertile ones with many short ramuli or bracteæ of which 3—4 are longer than the nucule and globule that they accompany.—*α. major;* larger, stems spinulose. *C. hispida, Linn.—E. Bot. t.* 463. *E. Fl. v.* 1. *p.* 7. *Ag. Syst. Alg. p.* 128.—*β. gracilis;* smaller, spinules obsolete. *C. hispida, β. Ag. Syst. Alg. p.* 128. *E. Fl. v.* 1. *p.* 7.

Ditches, especially in turfy bogs and lakes.—*β.* Lancing, Sussex. *Mr. Borrer.* Southport, Lancashire and Anglesea, *Mr. W. Wilson.* Near Croft, Yorkshire, *Rev. J. Dalton.*—In general this plant is thickly incrusted; but in a specimen gathered by Mr. Wilson in Cheshire and tallying with the figure in E. Bot., the incrustation is scarcely perceptible. Independent of this covering, the smaller variety very much resembles a large state of *C. vulgaris,* and the *α.*, a gigantic *C. aspera.* Indeed, I am sometimes of opinion that all our known *Charæ* may be referred to one or other of 2 species, *C. flexilis*, the type of the first division, and *C. vulgaris*, the type of the 2d; and that, like almost all aquatic plants, they are liable to great variation, dependant upon the soil, depth and movement of the water, and a variety of other circumstances. Agardh enumerates 24 species as natives of Europe, and most of them of the northern part of it; nearly the whole of which might probably be found in the waters of our own country, if carefully investigated.

ALGÆ.

Ord. VI. Algæ. *Juss.* (*Linn., part of*).

Aquatic Plants, with very few exceptions; of very varied form and texture: a single *globule* or a series of *globules* or *joints* placed one at the extremity of the other, so as to form a simple or branched filament (in some genera enveloped in gelatine) or united and extended in various directions and thus constituting a membranous or coriaceous almost horny more or less distinctly cellular *frond*, rounded, compressed or flat, simple or branched, the branches often foliaceous, nerveless, or costate and nerved, entire or serrated; the main stems in the coarser species almost woody and very fibrous; floating in the water or attached by a fibrous or scutate base to substances from which they appear to receive no nutriment, *that* being derived from the element by which they are surrounded. Their colour is various, different shades of green, brown, red, &c. After having been kept dry for a great length of time, they will revive by immersion in water; but only that portion of the plant which is immersed imbibes the fluid. The *Seeds* or *Sporules* consist of minute granules, internal, clustered or scattered, or imbedded in tubercles or peculiar processes arising from the frond. Often two or three different kinds or rather forms of fructification exist in the same species, but each apparently in itself is capable of becoming a new plant. There is nothing that can be compared to the stamens in phænogamous plants.

As we recede from the more perfectly formed (as they are termed) or more highly organized Cryptogamous plants which stand at the head of this arrangement, we find it more and more difficult to characterize in a few words the respective Orders or groupes, and to distinguish them from the neighbouring ones. But the eye, when a little practised, will soon enable the student to recognise them; and though the present extensive Natural Order is reckoned among the lowest of the vegetable creation, we shall find that it is scarcely exceeded by any in the form and colour and texture of its species, so that no cryptogamic plants have been more general objects of admiration and research; and, if their value is to be estimated by the service that mankind derives from them, they will hold a high rank in the scale. Many kinds are eaten in different parts of the world,

especially in the north of Europe, and some are esteemed great delicacies. Cattle, at certain seasons of the year, repair to the shores at low tide and devour the *sea-weeds* with great eagerness. From the marine Algæ, *iodine*, a new principle and possessed of very remarkable properties, is derived. It has been successfully employed in the cure of *goitres;* a disease which, Dr. Gillies informs us, has yielded in South America to the application of the stem of a certain *Fucus*, long before iodine was employed in civilized Europe. In the manufactory of kelp these same plants are of vast importance and the value of land rose in Scotland (during the war on the Continent and when we were deprived of the means of obtaining a pure alkali from the south of Europe), in a most extraordinary degree; so that the rocky boundary of our island yielded a great revenue to the different proprietors, and to our government, by the duty that was paid on the article produced. *Acanthophora muscoides* and *Gigartina Helminthochorton* hold a place in the pharmacopœia as vermifuges. *Chondrus crispus* has been of late largely collected in Ireland, after it has lain and become bleached upon the beach, and is used very generally as a substitute for isinglass, in making blanc-mange. The famous "*edible nests*" (the nest of the swallow, called *Hirundo esculenta*) are said to be made from a species of sea-weed: and lastly I may mention that sea-weed is employed to a vast extent in the manuring of land in the vicinity of the coast, either thrown on fresh, or first laid in a heap to ferment and mixed with other vegetable manures.

Low as this Order of plants is in the scale of vegetable beings, it is yet the one which approaches the nearest to certain animals. Indeed the ablest naturalists have been unable to draw the line of distinction between the least perfect of these and the less highly organized of animals.

In no country have the Algæ been more successfully studied than in Great Britain; and when the extent of our coast is considered, our numerous rivers, lakes and other situations favourable to their growth, it will be at once seen that few can have better opportunities of studying them than the naturalists of our islands. Woodward and Turner and Dillwyn have most extensively investigated and described our marine and fresh water Algæ, and the late Miss Hutchins of Bantry, and Mrs. Griffiths of Torquay, have studied this family of plants with a degree of perseverance, ardour and success, which has ranked their names with the most eminent algologists. Stackhouse, Lamouroux, Agardh and Lyngbye have been among the first to separate the old genera of *Fucus*, *Ulva* and *Conferva*, under which almost the whole of the present *Algæ* were arranged, into distinct and more or less well-marked genera. To this subject, Dr. Greville of Edinburgh has long devoted his

attention, and the result of his labours is displayed in one of the most beautiful and useful books connected with this branch of natural history, the *Algæ Britannicæ Inarticulatæ*. His arrangement and characters of the genera of that division of the *Algæ* I have almost implicitly followed, as the best that have appeared. The *Diatomeæ* he has kindly undertaken expressly for this work. I am indebted to W. H. Harvey, Esq. of Summerville, near Limerick, for all that concerns the rest of the *Algæ;* and I am here anxious to express my great obligations to that gentleman for the readiness with which, at my request, he undertook this most difficult task, and for which his zeal and his knowledge have rendered him peculiarly qualified. Those who have occasion to study the British species of this extensive tribe of plants, will, I am sure, duly appreciate his labours. The public, too, as well as myself, are greatly indebted to the late Capt. Carmichael of Appin, Argyleshire, for the ardour with which he explored the coasts in the vicinity of his residence, and the number of previously undescribed species which he has added to the catalogue. Upon his death, his herbarium and MSS. and drawings came into my possession, and no one is more anxious to do justice to the memory of this eminent cryptogamist, by recording his discoveries, than are Mr. Harvey and myself.

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Synopsis of the Genera.

Div. I. INARTICULATÆ.

Plants foliaceous, spreading or filiform, inarticulate (or rarely and only apparently articulated).

Tribe I. Fucoideæ. *Marine plants, of an olive-brown or olive-green colour, becoming black on exposure to the air; of a firm, coriaceous or ligneous substance and fibrous texture, tearing with facility in a longitudinal direction. Frond with a hard, scutate root, furnished in many species with distinct leaves. Vesicles or air-vessels generally present, which are either uniform dilatations of particular parts, or distinct bodies supported on little stalks. Fructification; tubercles contained in distinct receptacles, or imbedded in the frond and containing dark-coloured seeds surrounded with a pellucid limbus, which escape by a terminal pore. Grev.*

1. Sargássum. *Frond* leaved. *Leaves* stalked, with a midrib. *Air-vessels* simple, axillary, stalked. *Receptacles* small, linear, tuberculated (mostly in axillary clusters or racemes). *Seeds* in distinct cells. *Grev.*

2. Cystoseíra. *Frond* furnished with branch-like leaves, becoming more filiform upwards. *Air-vessels* simple, arranged consecutively within the substance of the branch-like leaves.

Receptacles cylindrical, more or less lanceolate, tuberculated, terminal. *Seeds* in distinct cells. *Grev.*

3. HÁLIDRYS. *Frond* compressed, coriaceous, linear, pinnated with distichous branches. *Air-vessels* lanceolate, stalked, divided by transverse septa. *Receptacles* lanceolate, stalked, compressed. *Seeds* in distinct cells. *Grev.*

4. FÚCUS. *Frond* plane, compressed or cylindrical, linear, dichotomous, coriaceous. *Air-vessels*, when present, innate in the frond, simple, large. *Receptacles* terminal (except in *F. nodosus*), turgid, containing tubercles imbedded in mucus, and discharging their *seeds* by conspicuous pores. *Grev.*

5. HIMANTHÁLIA. *Frond* coriaceous, orbicular, peziziform. *Vesicles* none. *Receptacles* elongated, strap-shaped, compressed, dichotomously divided, springing from the centre of the frond, containing immersed tubercles, furnished with a pore. *Grev.*

TRIBE II. LICHINEÆ. *Marine plants, of a blackish-green colour changing to deep black on exposure to the air, of a cartilaginous substance and fibrous texture. Frond flat or cylindrical, minute, branched in a dichotomous or subpalmated manner. Fructification terminal or nearly terminal, composed of capsules furnished with a pore and filled with a colourless gelatinous mass of very fine filaments, among which pellucid oval or oblong seeds are disposed in many radiating moniliform series. Grev.*

6. LICHÍNA. *Frond* cartilaginous, blackish-green, dichotomous. *Fructification;* roundish capsules of the same colour as the frond, containing radiating moniliform lines of pellucid *seeds*, imbedded in a gelatinous mass of filaments. *Grev.*

TRIBE III. LAMINARIEÆ. *Marine plants, of an olive-brown or olive-green colour, becoming somewhat darker on exposure to the air, varying in texture from coriaceous to membranaceous. Frond with a lobed or fibrous root, more or less stipitate and forming a plane, entire or cleft expansion, in a few cases furnished with one or more ribs. Vesicles none, (except in the exotic genus* Macrocystus,) *unless the hollow stem of some species be considered as such. Fructification, so far as is hitherto known, either seeds mixed with a mass of vertical, jointed filaments, or roundish granules, without filaments, forming, in both cases, dense, spreading spots or sori, on the surface of some part of the frond. Structure densely fibroso-cellular, without any appearance of reticulation. Grev.*

7. ALÁRIA. *Frond* membranaceous, furnished with a percurrent, cartilaginous midrib; the *stem* pinnated with distinct leaflets. *Fructification;* pyriform *seeds*, vertically arranged in the incrassated leaflets. *Grev.*

8. Laminária. *Frond* coriaceous (rarely membranaceous) plane, expanded, without a midrib. *Fructification; seeds* or *granules* forming dense sori or spots, and imbedded in the thickened surface of some part of the frond. *Grev.*

Tribe IV. Sporochnideæ. *Marine plants, of an olivaceous or yellowish-green colour (not changing to black in drying); of a cartilagineo-membranaceous substance, becoming flaccid almost immediately on exposure to the air, in some cases, acquiring under such circumstances a verdigris-green colour, and then possessing the property of rapidly decomposing other delicate Algæ in contact with them. Frond with a scutate (rarely tomentose) root, flat, compressed or cylindrical, with distichous (rarely irregular) branches, and bearing, in most species, at some period of their growth, little pencil-like deciduous tufts of fine green filaments. Fructification; so far as it is known, composed of club-shaped, moniliform, radiating filaments, either forming sessile warts, or arranged concentrically in little stalked, club-shaped bodies, terminated by pencils of delicate fibres. Grev.*

9. Desmaréstia. *Frond* cartilaginous, plane or compressed distichously branched, while young furnished with marginal deciduous tufts of fine green filaments, the branches set with marginal spines. *Grev.*

10. Dichlória. *Frond* cylindrical, filiform, cartilaginous, pinnated with opposite branches and becoming flaccid and of a verdigris-green colour on exposure to the air. *Fructification* unknown. *Grev.*

11. Sporóchnus. *Frond* filiform, cylindrical or compressed cartilagineo-membranaceous. *Fructification;* club-shaped, moniliform filaments, radiating in scattered warts, or concentrical in distinct (mostly clavate, stalked) *receptacles,* often terminated by a deciduous tuft of filaments. *Grev.*

Tribe V. Chordarieæ. *Marine plants, of an olive-green colour, becoming darker on exposure to the air, of a cartilaginous and lubricous substance. Root scutate. Frond continuous, cylindrical, filiform, composed of a solid cellular centre and a dense exterior mass of concentrical filaments. Fructification imperfectly known. Grev.*

12. Chordária. *Frond* filiform, cartilaginous, solid, continuous, composed exteriorly of a stratum of concentrical filaments. *Grev.*

Tribe VI. Dictyoteæ. *Marine plants, of an olive-green colour, not changing on exposure to the air, of a membranaceous, flexible (rarely cartilaginous) substance and reticulated structure. Root either naked and scutate or composed of a mass of woolly*

filaments. Frond cylindrical or flat, nerveless (except in Haliseris), *thin, entire or divided, often flabelliform. Fructification; roundish-ovate, pear-shaped or club-shaped seeds enveloped in a pellucid case, covering the surface, or scattered, or forming minute spots or transverse lines. The seeds in most cases are produced beneath the epidermis, through which they burst and become prominent. Grev.*

13. Chórda. *Frond* simple, filiform, cylindrical, with an interrupted cavity. *Root* naked, scutate. *Fructification;* external continuous masses of pear-shaped *seeds*, fixed by their base. *Grev.*

14. Asperocóccus. *Frond* tubular, cylindrical, continuous, membranaceous. *Root* minutely scutate, naked. *Fructification;* distinct spots composed of imbedded *seeds*, mixed with erect, club-shaped filaments. *Grev.*

15. Punctária. *Frond* simple, membranaceous, flat, with a naked scutate root. *Fructification* scattered over the whole frond in minute distinct spots, composed of roundish prominent *seeds*, intermixed with club-shaped filaments. *Grev.*

16. Striária. *Frond* filiform, tubular, continuous, membranaceous, branched. *Root* naked and scutate. *Fructification;* groupes of roundish *seeds*, forming transverse lines. *Grev.*

17. Dictyosíphon. *Frond* filiform, tubular, continuous, branched. *Root* minutely scutate, naked. *Fructification;* ovate, scattered *seeds*, lying beneath the epidermis. *Grev.*

18. Dictyóta. *Frond* flat, highly reticulated, membranaceous, dichotomous or irregularly cleft (palmato-flabelliform in *D. atomaria*). *Root* a mass of woolly filaments. *Fructification* composed of scattered, or variously aggregated, somewhat prominent *seeds*, on both surfaces of the frond. *Grev.*

19. Cutléria. *Frond* plano-compressed, cartilagineo-membranaceous, subflabelliform, irregularly cleft. *Root* a mass of woolly filaments. *Fructification;* minute tufts of *capsules*, scattered on both surfaces of the frond, the capsules pedicellate, containing several distinct *granules*. *Grev.*

20. Padína. *Frond* flat, highly reticulated, subcoriaceous, flabelliform, mostly undivided, marked with concentric lines. *Root* a mass of woolly filaments. *Fructification;* ovate, blackish *seeds*, fixed by their base, bursting through the epidermis in compact concentric lines, (rarely spots,) mostly on one surface of the frond. *Grev.*

21. Halíseris. *Frond* flat, linear, membranaceous, with a midrib. *Root* a mass of woolly filaments. *Fructification;* ovate

seeds, forming distinct *sori* or groupes (mostly arranged in longitudinal lines). *Grev.*

TRIBE VII. FURCELLARIEÆ. *Marine plants, of a dull dark-purplish or brownish-red colour, changing to black on exposure to the air. Substance cartilaginous. Structure cellular, with a dense coloured stratum of horizontal filaments, forming the circumference. Root creeping. Frond cylindrical, filiform, dichotomous. Fructification terminal, composed of pod-like indehiscent receptacles, within which is imbedded, near the circumference, a horizontal circular stratum of dark-brown oblong-pear-shaped seeds. Grev.*

22. FURCELLÁRIA. *Frond* cartilaginous, cylindrical, filiform, dichotomous. *Fructification;* terminal, elongated pod-like *receptacles*, containing a stratum of dark, oblong-pear-shaped *seeds* in the circumference. *Grev.*

TRIBE VIII. SPONGIOCARPEÆ. *Marine plants, of a dull dark reddish-purple colour, changing to nearly black on exposure to the air, of a cartilaginous substance and cellular structure. Root scutate. Frond filiform, cylindrical and dichotomous. Fructification uniform, consisting of naked, spongy warts, composed of a mass of radiating filaments, among which are imbedded numerous, roundish clusters of seeds, surrounded with a pellucid border; the seeds wedge-shaped, fixed by their base to a central point. Grev.*

23. POLYÍDES. *Frond* cartilaginous, filiform, cylindrical. *Fructification;* naked, spongy warts, composed of radiating filaments, among which are imbedded roundish clusters of wedge-shaped *seeds*, surrounded with a pellucid border. *Grev.*

TRIBE IX. FLORIDEÆ. *Marine plants, of a purplish-reddish or fine rose colour, seldom changing much by exposure to the air; of a coriaceous, cartilaginous or membranaceous substance and cellular texture, often reticulated. Frond flat, compressed or cylindrical, with or without a midrib; sometimes furnished with distinct leaves or foliaceous expansions. Fructification often of two kinds; the first, spherical or hemispherical capsules, sessile or stalked and containing a round mass of seeds — the second composed of granules (mostly ternate), scattered or collected into little spots (sori) or lines, and situated either in the general substance of the frond, or in leaflets or distinct pod-like foliaceous processes. More than one kind of fructification is never found upon the same individual. Grev.*

24. DELESSÉRIA. *Frond* rose-red, flat, membranaceous, with a percurrent midrib. *Fructification* of two kinds: — *capsules* containing a globular mass of *seeds*, and ternate *granules*,

forming definite sori in the frond, or in distinct foliaceous leaflets. *Grev.*

25. Nitophýllum. *Frond* plane, delicately membranaceous, rose-coloured, reticulated, wholly without veins or only with very slight vague ones towards the base. *Fructification;* hemispherical *capsules*, imbedded in the substance of the frond; and ternate *granules*, forming distinct scattered spots. *Grev.*

26. Rhodoménia. *Frond* plane, membranaceous, fine pink or red, quite veinless, sessile, or with a short stem which expands immediately into the frond. *Fructification;* hemispherical scattered *capsules;* and minute ternate *granules*, spreading over the whole or some part of the frond, (not in defined spots). *Grev.*

27. Plocámium. *Frond* filiform, compressed, between membranaceous and cartilaginous, fine pink-red, much branched, branches distichous (alternately secund and pectinate). *Fructification;* spherical, sessile *capsules;* and lateral minute processes, containing oblong *granules*, transversely divided into several parts by pellucid lines. *Grev.*

28. Microcládia. *Frond* filiform, compressed, subcartilaginous, irregularly branched, the branches distichous. *Fructification;* sessile spherical *capsules*, accompanied by an involucre, in the form of several short ramuli; and ternate *granules*, in the swollen apices of the branches. *Grev.*

29. Odonthália. *Frond* plane, between membranaceous and cartilaginous, dark vinous-red, with an imperfect or obsolete midrib, and alternately toothed at the margin. *Fructification* marginal, axillary or in the teeth: —*capsules* containing pear-shaped *seeds*, fixed by their base; and slender processes containing ternate *granules*. *Grev.*

30. Rhodómela. *Frond* cylindrical or compressed, filiform, much branched, coriaceo-cartilaginous (the apex sometimes involute). *Fructification;* subglobose *capsules*, containing free, pear-shaped *seeds;* and pod-like receptacles with imbedded ternate *granules*. *Grev.*

31. Bonnemaisónia. *Frond* membranaceous, compressed or plane, filiform, much branched, the branches pectinate with distichous ciliæ. *Fructification;* sessile or pedicellate *capsules*, containing a cluster of pyriform (compound?) *seeds*, fixed by their base. *Grev.*

32. Lauréncia. *Frond* cylindrical, filiform, between cartilaginous and gelatinous, mostly yellowish or purplish-red. *Fructification* of two kinds: ovate *capsules*, with a terminal pore, containing a cluster of stalked pear-shaped *seeds*, fixed by their base; and ternate *granules* imbedded in the ramuli. *Grev.*

33. Chylocládia. *Frond* cylindrical, filiform (often contracted as if jointed), between gelatinous and cartilaginous, of a pinky-red colour. *Fructification* of two kinds: spherical ovate or conical *capsules*, with wedge-shaped or angular *seeds*; and imbedded, ternate *granules*. *Grev.*

34. Gigartína (Gracilaria and Gigartina, *Grev.*). *Frond* cartilaginous, filiform, cylindrical or compressed, irregularly branched, of a dull red colour. *Fructification*;—*capsules* containing a mass of minute roundish *seeds*; and roundish or oblong, simple *granules*, imbedded in the fronds of distinct plants. *Grev.*

35. Chóndrus. *Frond* cartilaginous, dilating upwards, flat, nerveless, dichotomously divided, of a purplish or livid-red colour. *Fructification*; subspherical *capsules*, in the substance of the frond (rarely supported on little stalks), containing a mass of minute free *seeds*. *Grev.*

36. Phyllóphora. *Frond* cartilaginous or membranaceous, of a purple rose-colour, plane, proliferous from the disk, furnished with a more or less imperfect or obscure midrib. *Fructification*; *capsules* containing a mass of minute roundish free *seeds*;—and *sori* of simple *granules*, in little foliaceous processes. *Grev.*

37. Sphærocóccus. *Frond* cartilaginous, compressed, two-edged, linear, distichously branched. *Fructification*; mucronate *capsules*, containing a mass of ovate shortly pedicellate red *seeds*. *Grev.*

38. Gelídium. *Frond* between cartilaginous and horny, compressed, linear, more or less regularly pinnated. *Fructification*; *capsules* imbedded in the substance of the ramuli, containing a mass of minute roundish *seeds*; and ternate or otherwise compound *granules* in the ramuli, on distinct individuals. *Grev.*

39. Gratelóupia. *Frond* cartilagineo-membranaceous, plane, sometimes pinnated with branchlets or fringed with foliaceous processes. *Fructification*; minute aggregated tubercles furnished with a pore and containing a mass of free elliptical or roundish *seeds*. *Grev.*

40. Chætóspora. *Frond* subcartilaginous, filiform, branched, rose-coloured, ultimate ramuli setaceous, swelling into lanceolate *receptacles*, composed of naked branched filaments radiating from an axis, in the centre of which is situated the obscure *fructification* (minute *seeds* or *capsules*). *Grev.*

41. Ptilóta. *Frond* compressed or flat, pectinato-pinnate, of a red colour, between membranaceous and cartilaginous.

Fructification ; minute, aggregated *capsules*, surrounded by an involucre. *Grev.*

TRIBE X. GASTROCARPEÆ. *Plants all marine, with a scutate root, of a pink, red, or purplish-red colour, most of them not changing much on exposure to the atmosphere, of a carnose, gelatino-cartilaginous or gelatino-membranaceous substance ; the structure consisting of a cellular external coat or membrane, and a pellucid, gelatinous, internal mass, mostly traversed by colourless jointed filaments arising from the outer membrane. Frond cylindrical, compressed or flat, continuous, destitute of midrib or veins. Fructification ; roundish clusters or globules of red seeds, imbedded in the internal gelatinous substance of the frond, and often unaccompanied by an external pore. Grev.*

42. IRIDÆA. *Frond* flat, expanded, carnose or gelatino-cartilaginous, more or less of a purplish-red colour. *Fructification ; globules* of roundish *seeds*, imbedded between the two coats of the frond. *Grev.*

43. HALYMÉNIA. *Frond* nearly flat or cylindrical, gelatino-membranaceous, of a pinky-red colour, more or less dichotomous, the segments often laciniated. *Fructification ;* punctiform *globules* of *seeds*, imbedded in the central substance of the frond. *Grev.*

44. DUMÓNTIA. *Frond* cylindrical, simple or branched, membranaceous, tubular, gelatinous within, of a red or purple-red colour. *Fructification ; globules* of *seeds*, attached to the inner surface of the membrane of the frond. *Grev.*

45. CATENÉLLA. *Frond* filiform, somewhat compressed, creeping, throwing up numerous branches, contracted, as if jointed, in a moniliform manner, composed internally of branched filaments radiating from the centre. *Fructification* unknown. *Grev.*

TRIBE XI. ULVACEÆ. *Plants found in the sea, in fresh-water or on damp ground, &c., of an herbaceous green or fine purple colour, of a thin tender membranaceous substance and reticulated structure, rarely gelatinous. Frond with a very minutely scutate root, expanded, or tubular and continuous. Fructification ; roundish and mostly quaternate granules or minute sporular grains, imbedded in the delicate membrane of the frond. Grev.*

46. PORPHÝRA. *Frond* plane, exceedingly thin and of a purple colour. *Fructification ;* 1. scattered sori of oval *seeds ;* —2. roundish *granules*, mostly arranged in a quaternate manner, and covering the whole frond. *Grev.*

47. Ulva. *Frond* membranaceous, of a green colour, plane (in some cases saccate, and inflated in a young state). *Fructification;* minute *granules,* mostly arranged in fours. *Grev.*

48. Tetraspóra. *Frond* tubular or inflated, gelatinous. *Fructification;* minute *granules,* loosely arranged in fours. *Ag.*

49. Enteromórpha. *Frond* tubular, hollow, membranaceous, of a green colour and reticulated structure. *Fructification;* three or four roundish *granules,* aggregated in the reticulations. *Grev.*

50. Bángia. *Frond* flat, capillary, membranaceous, of a green, reddish or purple colour. *Fructification; granules* arranged more or less in a transverse manner. *Grev.*

Tribe XII. Siphoneæ. *Plants found in the sea, in fresh water or on damp ground, &c., of an herbaceous green colour. Frond either composed of membranaceous, filiform, continuous, simple or branched tubes, or formed of a combination of similar tubes, and then presenting a lax spongy body of various forms, crustaceous, globular, cylindrical or flat. Fructification; vesicles* (coniocystæ, Ag.) *produced on the outer surface of the tubes, filled with a dark-green granular mass:* (*in* Botrydium,) *the entire plant is little more than a hollow green globule with a radicating tuft of fibres, whose fructification is unknown. Grev.*

51. Códium. *Frond* spongy, dark-green (crustaceous, globular, cylindrical or flat), composed of an interwoven mass of tubular continuous filaments. *Fructification;* opaque *vesicles,* attached to the filaments near the surface of the frond. *Grev.*

52. Bryópsis. *Frond* membranaceous, filiform, tubular, cylindrical, glistening, branched, the branches imbricated, or distichous and pinnated, filled with a green minutely *granuliferous fluid. Grev.*

53. Vauchéria. *Fronds* aggregated, tubular, continuous, capillary, coloured by an internal green pulverulent mass. *Fructification;* dark-green homogeneous *vesicles* (coniocystæ, Ag.) attached to the frond. *Grev.*

54. Botrýdium. *Plant* a sphærical vesicular *receptacle,* filled with a watery fluid, dehiscent at the apex, terminating below in a radicating tuft of fibres. *Grev.*

Tribe XIII. Lemanieæ. *Aquatic plants, existing in fresh and rapidly running water. Fronds slender, tubulose, either whorled with papillæ or moniliform, formed of a coriaceous cellulose membrane, the cells regular, interspersed with intercellular ducts. From scattered points obscurely conspicuous, even externally upon this membrane, but on its interior surface, there arise fascicles of minute simple or dichotomous, moniliform, arti-*

culated threads; the articulations elliptical, being themselves the seeds or sporidia, separating in age and germinating. Ag.

55. LEMÁNIA. *Frond* filiform, torulose or inflated at intervals, coriaceous, cellular. *Seeds* or *sporules* beaded, collected into pencil-shaped tufts, and fixed to the inner surface of the hollowed part of the frond.

DIV. II. CONFERVOIDEÆ.[1]

Plants filamentous, really or apparently articulated (destitute of definite gelatine).

TRIBE XIV. ECTOCARPEÆ. *Plants olivaceous or virescent, marine. Fructification monœcious; external capsules, and globules in swollen ramuli.*

56. CLADOSTÉPHUS. *Ramuli* whorled.

57. SPHACELÁRIA. Rigid, mostly pinnate, longitudinally striated, the apices sphacelated.

58. ECTOCÁRPUS. Capillary, flaccid, the apices attenuated, acute.

TRIBE XV. CERAMIEÆ. *Plants red or purple, rarely brown, marine. Fructification double, diœcious;* —1. *external capsules;* —2. *polymorphous receptacles or granules in swollen ramuli.*

59. POLYSIPHÓNIA. Longitudinally striated, with internal parallel tubes. *Fructification;* —1. ovate *capsules;* —2. *granules* in swollen ramuli.

60. DÁSYA. *Stems* inarticulate, cellulose, the ramuli articulated. *Fructification;* —1. ovate *capsules;* —2. lanceolate *receptacles*, including *granules* in transverse fasciæ.

61. CERÁMIUM. *Filaments* reticulated, dissepiments opaque. *Fructification;* —1. roundish *capsules* with a membranaceous *pericarp;* —2. oblong *granules* in the upper ramuli.

62. SPYRÍDIA. *Main filaments* inarticulate, cartilaginous, beset with articulated ramuli; dissepiments opaque. *Fructification;* —1. trisporous *capsules* with hyaline *pericarps* clustered round the bases of the ramuli; —2. pedunculated gelatinous *receptacles* with membranaceous *pericarps*, often surrounded by an involucre of short ramuli, containing two or three masses of roundish *granules*.

63. GRIFFÍTHSIA. *Filaments* mostly dichotomous, dissepiments hyaline. *Fructification;* —1. clustered *capsules* and

[1] By W. H. Harvey, Esq.

hyaline *pericarps*;—2. roundish, gelatinous, involucrated *receptacles*, including minute *granules*.

64. Calithámnion. *Filaments* mostly pinnated, dissepiments hyaline. *Fructification*;—1. scattered *capsules* with hyaline *pericarps*;—2. polymorphous *receptacles*, containing large *granules*.

Tribe XVI. Conferveæ. *Plants green, very rarely pink or brown. Fructification* (*except in* Bulbochæte) *a granular coloured internal mass* (*called* endochrome) *which affects various forms.—Fresh-water or marine.*

65. Bulbochæte. *Filaments* branched, each articulation bearing a deciduous inarticulate *seta*, fixed by a scutate base.

66. Conférva. *Filaments* simple or branched, articulated, uniform. *Fructification*; a granular internal mass filling the tube.

67. Hydrodíctyon. *Filaments* forming a net-work with regular polygonal meshes.

68. Mougeótia. *Filaments* simple, finally united by transverse tubes. *Endochrome* uniform, granular.

69. Tentarídia. *Filaments* simple, finally united by transverse tubes. *Endochrome* bipinnate.

70. Zygnéma. *Filaments* simple, finally united by transverse tubes. *Endochrome* forming spiral rings.

Tribe XVII. Oscillatoriæ. *Plants green or brown, rarely purple, continuous, tubular, seldom branched, though often agglutinated together so as to appear branched. Fructification; an internal mass divided by transverse septa, which finally separates into roundish or lenticular sporidia.—Fresh-water, marine, or on damp ground.*

71. Stigonéma. *Filaments* cartilaginous, branched, marked with transverse dotted rings.

72. Scytonéma. *Filaments* brown, truly branched, flaccid, tough.

73. Calothríx. *Filaments* green or purple, short, erect simple or pseudo-branched.

74. Lyngbýa. *Filaments* green or purple, decumbent, very long, flaccid.

75. Rosária. *Filaments* contracted at regular intervals; *locules* bipartite.

76. Oscillatória. *Filaments* rigid, acicular, radiating and oscillating from a slimy stratum.

77. Belónia. *Filaments* minute, heaped together, submoniliform, finally dissolving into elliptic *sporidia*.

TRIBE XVIII. BYSSOIDEÆ. *Plants of doubtful affinity, related to the Fungi. Filaments articulated, hyaline or coloured. Fructification; granules scattered among the filaments, or capsules.—Found on rotten wood, among mosses, on the ground, on glass, or in chemical solutions: a few inhabit fresh-water and one or two the sea.*

78. BYSSOCLÁDIUM. *Filaments* arachnoid, radiating from a centre, with scattered external *granules.*

79. MYCINÉMA. *Filaments* membranaceous, opaque, tenacious, coloured, (on rotten wood).

80. CHROOLÉPUS. *Filaments* rigid, subsolid, opaque, torulose, falling to powder.

81. TRENTEPÓHLIA. *Filaments* flexile, coloured, capsuliferous. *Capsules* terminal, (on trees, rocks, and in fresh-water).

82. PROTONÉMA. *Filaments* subarticulated, rooting, (among mosses).

83. HYGROCRÓCIS. *Filaments* hyaline, interwoven into an uniform membrane or gelatine, (in chemical solutions).

84. LEPTOMÍTUS. *Filaments* hyaline, erect, parasitical, (growing in fresh-water or the sea).

DIV. III. GLOIOCLADEÆ.[1]

Plants consisting of numerous globules, or filaments invested with a definite gelatine and forming globose or filiform fronds.

TRIBE XIX. BATRACHOSPERMEÆ. *Plants filiform or globose, composed of articulated, branched filaments, invested with gelatine. Fructification; so far as it is known, capsules on the ultimate ramuli.—Marine or in fresh-water.*

A. *Filiform.*

85. MESOGLÓIA. *Axis* gelatinous. *Periphery* composed of branched subdichotomous filaments.

86. BATRACHOSPÉRMUM. *Filaments* hyaline, longitudinally striated, set with distant whorls of moniliform ramuli.

87. DRAPARNÁLDIA. *Filaments* hyaline, emitting scattered pencils of coloured ramuli.

B. *Globose or lobed.*

88. CHÆTÓPHORA. *Frond* gelatinous, globose, plane or lobed, formed of filaments issuing from the base.

[1] By W. H. Harvey, Esq.

89. Corynéphora. *Frond* carnoso-coriaceous, hollow, formed of filaments issuing from a central point.

90. Myrionéma. *Frond* minute, gelatinous, parasitical composed of short, erect, clavate, simple filaments "fixed at their base to a thin expansion." *Grev.*

Tribe XX. Rivularieæ. *Plants more or less globose, never filiform, carnose, composed of continuous filaments annulated within.*

91. Rivulária.—Character the same as that of the Family.

Tribe XXI. Nostochineæ. *Plants more or less globose, gelatinous or carnose, including granules scattered through the mass or arranged in moniliform series.*

92. Protocóccus. *Globules* aggregated, naked, filled with *granules*, seated on a hyaline jelly.

93. Hæmatocóccus. *Minute* gelatinous *fronds*, aggregated into a frustulose crust and including scattered *granules.*

94. Palmélla. A polymorphous *gelatine*, filled with distinct globular or elliptic *granules.*

95. Echinélla. Minute gelatinous *fronds*, filled with elliptical *corpuscules*, radiating from a centre.

96. Nóstoc. A gelatinous polymorphous *frond*, filled with crisped moniliform filaments.

APPENDIX.

97. Schythyménia. A tough, coriaceous, spreading *frond*, composed of fibres intermixed with *granules.*

Div. IV. DIATOMACEÆ.[1]

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. Meloseíra. *Frustula* forming simple pseudo-articulated *filaments*, constricted at the articulations, fragile, easily separating.

[1] By Dr. Greville.

99. Desmídium. *Frustula* forming simple angular pseudo-articulated *filaments*, hyaline at the crenate angles, at length separating.

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

100. Fragilária. *Frustula* forming plane, pseudo-articulated, densely striated, fragile filaments, separating at the striæ (not cohering at their angles).

101. Achnánthes. *Frond* stipitate, standard-shaped, composed of few *frustula*, which at length separate (without cohering at their angles).

102. Diatóma. *Frustula* forming pseudo-articulated, plane filaments, at length separating and cohering at their angles.

103. Frustúlia. *Frustula* linear, free or imbedded in a shapeless mass, solitary or binate.

Tribe XXIV. Styllarieæ. *Frustula plane, wedge-shaped.*

104. Styllária. *Frustula* wedge-shaped, separate, stemless, not united into plane laminæ.

105. Licmóphora. *Frustula* wedge-shaped, flabelliform, stipitate.

106. Merídion. *Frustula* wedge-shaped, in plane sessile circles or segments of circles.

Tribe XXV. Cymbelleæ. *Frustula elliptical.*

107. Gomphonéma. *Frustula* subgeminate, terminating a very slender, simple or branched *filament.*

108. Homœocládia. *Frustula* arranged in numerous, binate, distant, parallel series, within a tubular *frond.* *Ag.*

109. Berkléya. *Frustula* in longitudinal series, within simple mucous filaments, which are free at the extremity, but united below into a roundish gelatinous mass.

110. Micronéga. *Frustula* arranged in longitudinal series, within a cartilaginous or gelatinous *frond.* *Ag.*

111. Schizonéma. *Frustula* in longitudinal series and inclosed in a simple or branched, filiform, mucous, membranaceous *frond.*

112. Cymbélla. *Frustula* elliptical, binate, free, or imbedded in a mucous mass.

CRYPTOGAMIA ALGÆ.

Plants foliaceous, spreading or filiform, inarticulate (or rarely and only apparently articulated).

Div. I. INARTICULATÆ.

Fronds more or less spreading, rarely filiform, never distinctly jointed. Gen. 1—55.

Tribe I. Fucoideæ.

Plants all marine, of an olive-brown or olive-green colour, becoming black on exposure to the air; of a firm, coriaceous or ligneous substance and fibrous texture, tearing with facility in a longitudinal direction. Frond with a hard scutate root, furnished in many species with distinct leaves. Vesicles or air-vessels generally present, which are either uniform dilatations of particular parts, or distinct bodies supported on little stalks. Fructification; tubercles contained in distinct receptacles, or imbedded in the frond, and containing dark-coloured seeds surrounded with a pellucid limbus, and escaping by a terminal pore. Grev.

1. Sargássum. *Ag.* Sargassum.

Frond leaved. *Leaves* stalked, with a midrib. *Air-vessels* simple, axillary, stalked. *Receptacles* small, linear, tuberculated (mostly in axillary clusters or racemes). *Seeds* in distinct cells. *Grev. Alg. Brit. p.* 1. *t.* 1.—Name, from the Spanish *sargazo*, applied to the floating masses of this genus, which, in the seas of warmer climates, are so abundant as even to impede the progress of vessels.

1. S. *vulgáre*, Ag. (*common Sargassum*); stem compressed filiform pinnated, branches alternate simple, leaves linear-lanceolate serrated, vesicles sphærical on flat petioles, receptacles cylindrical racemose. *Ag. Sp. Alg. v.* 1. *p.* 3. *Grev. Alg. Brit. p.* 2. *t.* 1.—*Fucus natans, Turn. Hist. Fuc. t.* 46. *E. Bot. t.* 2114.

Occasionally cast ashore on the Orkney islands, wafted by the currents, probably from the West Indies, along with other exotic productions.

2. S. *baccíferum*, Ag. (*berry-bearing Sargassum*); stem cylindrical filiform bipinnate, branches alternate mostly simple, leaves linear serrated, vesicles serrated on cylindrical petioles. *Ag. Sp. Alg. v.* 1. *p.* 6. *Grev. Alg. Brit. p.* 3. —*Fucus bacciferus, Turn. Hist. Fuc. t.* 47. *E. Bot. t.* 1967.

Sometimes wafted, like the last, to the Orkney islands. Shore of Castle Eden Dean, Durham; *Mr. W. Backhouse.*

2. CYSTOSEÍRA. *Ag.* Cystoseira.

Frond furnished with branch-like leaves, becoming more filiform upwards. *Air-vessels* simple, arranged consecutively within the substance of the branch-like leaves. *Receptacles* cylindrical, more or less lanceolate, tuberculated, terminal. *Grev. Alg. Brit. p.* 3. *t.* 2.—Name, κυστις, a *bladder*, and σειρα, a *chain*, from the chain-like little bladders.

1. C. *ericoídes*, Ag. (*heath-like Cystoseira*); frond cylindrical branched closely beset every where with very short subulate spinous leaves or branchlets, vesicles elliptical solitary, receptacles swelling at the base of the terminal spines. *Grev.*—*Ag. Sp. Alg. v.* 1. *p.* 52. *Grev. Alg. Brit. p.* 4.—*Fucus ericoides, Linn.*—*Turn. Hist. Fuc. t.* 191. *E. Bot. t.* 1968.—*F. tamariscifolius, Huds.*—*F. selaginoides, Linn.*—*Turn. Syn. Fuc. p.* 85.

Rocks, especially on the S. West coast of England, where *Mrs. Griffiths* finds it abundantly. Bantry Bay, *Miss Hutchins*. Summer and Autumn. ♃.

2. C. *granuláta*, Ag. (*granulated Cystoseira*); frond cylindrical, stem bearing elliptical knobs each producing a filiform repeatedly dichotomo-pinnate branch furnished with remote subulate spines, air-vessels elliptical-lanceolate two or three connected together, receptacles elongated. *Grev.*—*Ag. Sp. Alg. v.* 1. *p.* 55. *Grev. Alg. Brit. p.* 5. *t.* 2.—*Fucus granulatus, Linn.*—*Turn. Hist. Fuc. t.* 251. *E. Bot. t.* 2169.—*F. mucronatus, Turn. Syn. Fuc. p.* 73.—*F. fæniculaceus, Good. et Woodw. in Linn. Trans. v.* 3. *p.* 134.

Rocky pools left by the receding of the tide, particularly in Devon and Cornwall, *Mrs. Griffiths*, *Mr. Rashleigh*, *Mr. Turner*, *&c.* Bantry Bay, *Miss Hutchins*. Summer. ♃.—Distinguishable from all other British species by the numerous elliptical knobs on the stem, except from the following, from which it is known by the absence of the terminal spine of the receptacles.

3. C. *barbáta*, Ag. (*bearded Cystoseira*); frond cylindrical, stem furnished with elliptical knobs each producing a branch many times dichotomo-pinnate and filiform, air-vessels lanceolate chain-like, receptacles ovato-elliptical mucronate. *Grev.*—*Ag. Sp. Alg. v.* 1. *p.* 57. *Grev. Alg. Brit. p.* 6.—*F. barbatus, Good. et Woodw. in Linn. Trans. v.* 3. *p.* 128. *Turn. Hist. Fuc. t.* 250. *E. Bot. t.* 2170.—*F. granulatus, Good. et Woodw. in Linn. Trans. v.* 3. *p.* 131. (excl. the syn.)

Said to have been gathered by Hudson on the Devonshire coast.

4. C. *fæniculácea*, Ag. (*fennel-leaved Cystoseira*); frond compressed, stem destitute of tuberous knobs, branches more or less rough with little hard points repeatedly pinnate filiform, air-vessels solitary or about two together, receptacles linear-lanceolate mostly proceeding from the terminal vesicles. *Grev.*

—*Ag. Sp. Alg. v.* 1. *p.* 62. *Grev. Alg. Brit. p.* 7.—*C. abrotanifolia, Ag. Sp. Alg. v.* 1. *p.* 63.—*Fucus fæniculaceus, Linn.* —*Turn. Hist. Fuc. t.* 252.—*F. discors, Linn.*—*Turn. Syn. Fuc. p.* 70. *E. Bot. t.* 2131.—*F. abrotanifolius, Linn.*—*Turn. Syn. Fuc. p.* 66. *E. Bot. t.* 2130.

Coast of the south and south-west of England. Summer. ♃.—In a young state this plant has flat, pinnated leaves, one or two lines broad, which in age are gradually converted into branches, and hence has arisen the idea of 2 species, which the observations of Mrs. Griffiths, Mr. Turner, and Dr. Greville have clearly shown to be only different states of the same plant.

5. C. *fibrósa*, Ag. (*fibrous Cystoseira*); frond bushy very much branched, branches filiform the terminating branchlets (or leaves) linear plane, vesicles elliptical mostly solitary, receptacles filiform much elongated. *Grev.*—*Ag. Sp. Alg. v.* 1. *p.* 65. *Grev. Alg. Brit. p.* 8.—*Fucus fibrosus, Huds.*—*Turn. Syn. Fuc. p.* 93, *Hist. Fuc. t.* 209. *E. Bot. t.* 1969.

Chiefly on the southern coasts, as Falmouth, Ilfracombe, Weymouth, Hampshire, Dover, and Selsey. Yarmouth Beach and coast of Yorkshire. Summer. ♃.—"The vesicles of this fine species," Dr. Greville observes, "which are 3 or 4 times wider than the part in which they appear, and about the size of a vetch-seed, with the bushy and somewhat harsh appearance of the frond, suffice to distinguish it at first sight."

3. Hálidrys. *Lyngb.* Halidrys.

Frond compressed, coriaceous, linear, pinnated with distichous branches. *Air-vessels* lanceolate, stalked, divided by transverse septa. *Receptacles* lanceolate, stalked, compressed. *Seeds* in distinct cells. *Grev. Alg. Brit. p.* 9. *t.* 1.—Name; αλς, αλις the *sea*, and δρυς, an *oak*, or tree.

1. H. *siliquósa*, Lyngb. (*podded Halidrys*). *Lyngb. Hydroph. Dan. p.* 37.—*Cystoseira siliquosa, Ag. Sp. Alg. v.* 1. *p.* 72. *Turn. Syn. Fuc. p.* 60, *Hist. Fuc. t.* 159. *E. Bot. t.* 474.—β. smaller. *Fucus siliquosus, Stackh.*

Sea-coast, every where.—β. in pools or basins, exposed by the receding of the tide. ♂.

4. Fúcus. *Ag. Linn.* (*part of*). Fucus.

Frond plane, compressed or cylindrical, linear, dichotomous, coriaceous. *Air-vessels*, when present, innate in the frond, simple, large. *Receptacles* terminal (except in *F. nodosus*), turgid, containing tubercles imbedded in mucus, and discharging their seeds by conspicuous pores. *Grev. Alg. Brit. p.* 11. *t.* 2. —Name, φυκος, a *sea-weed*.

I have followed Dr. Greville in restricting the old genus *Fucus* to those species enumerated by Agardh, with the exception of *Fucus* (now *Himanthalia*) *loreus*, and *Fucus* (now *Splachnidium*) *rugosus*. The Fuci are among the most valuable of the tribes in the preparation of kelp.

1. F. *vesiculósus*, Linn. (*bladdered Fucus*); frond plane linear dichotomous quite entire with a central rib, vesicles sphærical, receptacles terminal compressed turgid mostly elliptical and solitary.—*Turn. Syn. Fuc. p.* 117, *Hist. Fuc. t.* 88. *E. Bot. t.* 1066. *Grev. Alg. Brit. p.* 12. *t.* 2. *Grev. Fl. Crypt. t.* 319.—β. *spiralis;* frond spirally twisted, vesicles none, receptacles roundish. *Turn.*—*F. spiralis, Lightf.*—*E. Bot. t.* 1685.—γ. *linearis;* frond narrow dwarfish, vesicles none, receptacles long between linear and lanceolate. *Turn.*—*F. distichus, Lightf.*—δ. *balticus;* yellow-brown, very dwarf, densely tufted, with an indistinct midrib and no vesicles or receptacles.—*F. balticus, Ag. in Svensk, Bot. t.* 576. *Grev. Crypt. Fl. t.* 181.

Rocky shores, every where, most abundant.—β. Leith and Newhaven, &c.—γ. Orkney, *Dr. Hope.* Ardthur, *Capt. Carmichael.*—δ. Salt-marshes and sands occasionally flooded by the sea in the West Highlands and islands of Scotland. Summer and autumn. ♃.—Very variable, according to the substance on which it grows and its being more or less constantly covered with salt-water: sometimes, besides the usual true vesicles, there are elongated swellings occasioned by an accidental accumulation of air between the coats of the frond. This sea-weed is abundantly employed in the manufacturing of kelp, if it be not the best. But this, important as it is in a commercial point of view, is not the only end it serves. In the isles of Jura and Skye it is frequently a winter food for cattle, which regularly come down to the shores at the receding of the tide to seek for it; and sometimes even the deer have been known to descend from the mountains to the sea-side to feed upon this plant. Linnæus informs us that the inhabitants of Gothland, in Sweden, boil this Fucus with water, and, mixing with it a little coarse meal or flour, feed their hogs upon it; for which reason they call the plant *Swintang:* and in Scania, he says, the poor people cover their cottages with it, and use it for fuel. In Jura and some other Hebrides, the inhabitants dry their cheeses without salt, by covering them with the ashes of this plant; which abounds so much in that substance, that from five ounces of the ashes may be procured two ounces and a half of fixed alkaline salts, or half their own weight.

2. F. *ceranoídes,* Linn. (*horned Fucus*); frond coriaceo-membranaceous linear subdichotomous with a central rib pinnated with narrow lateral scattered multifid spreading fruit-bearing branches, receptacles solitary terminal subcylindrical linear acuminated.—*Turn. Syn. Fuc. p.* 136, *Hist. Fuc. t.* 89. *E. Bot. t.* 2115. *Grev. Alg. Brit. p.* 14. *Ag. Sp. Alg. v.* 1. *p.* 93.

Abundant on the sea-shores of Scotland, especially in the sheltered bays and inlets of the sea on the west coast, often half imbedded in sand. Rare in England. Coast of Hampshire, Shoreham, Anglesea, Dorset; near Belfast, Ireland. Spring and Summer. ♃.—This is of a thinner substance and paler colour than the preceding, and its ramification is considerably different.

3. F. *serrátus,* Linn. (*serrated Fucus*); frond flat broadly linear dichotomous with a central rib and serrated, receptacles solitary terminal flat elongated serrated.—*Turn. Syn. Fuc.*

p. 110, *Hist. Fuc. t.* 90. *E. Bot. t.* 1221. *Ag. Sp. Alg. v.* 1. *p.* 95. *Grev. Alg. Brit. p.* 15.

Rocky sea-shores, abundant. Spring and Summer. ♃.— This contains far less salt than *F. vesiculosus*, and is consequently much less esteemed for kelp. In Norway it is the food of cattle, sprinkled with a little meal, according to Gunner. The Dutch cover their crabs and lobsters with it, and say that it is preferable to *F. vesiculosus*, because the mucus from the vesicles of the latter ferments and soon becomes putrid. Captain Carmichael observes that "this Fucus is never burnt for kelp on the shores of Appin, being found less productive of soda than *F. nodosus* and *F. vesiculosus*, the only species here used for that manufacture. It is employed as manure, and with much benefit, though its value endures but for a single season. It is found peculiarly well adapted to potato culture, and when spread on the ground in winter yields an abundant crop of the very best hay. But if its application be deferred till the time of planting, the former produce, though equally abundant, is watery, ill-tasted, and unfit for the table, though it answers well enough for seed. This remark equally applies to all the Algæ, which, under the general name of *Cart-wracks*, are rolled ashore by the gales."

4. F. *nodósus*, Linn. (*knotted Fucus*); frond compressed without a midrib subdichotomous branched in a pinnated manner, vesicles remote, receptacles lateral distichous large pedunculated roundish-pyriform. — *Turn. Syn. Fuc. p.* 252, *Hist. Fuc. t.* 91. *E. Bot. t.* 570. *Ag. Sp. Alg. v.* 1. *p.* 85. *Grev. Alg. Brit. p.* 16. — *Halidrys nodosa, Lyngb.*

Rocky shores, common. Winter and Spring. ♃.— This is the most thick and coriaceous of any of our Fuci. It is said in the Hebrides to be preferable to all other Fuci in the manufacturing of kelp, and passes there under the name of *kelp-wrack*.

5. F. *Mackáii*, Turn. (*Mr. Mackay's Fucus*); frond nearly cylindrical subcompressed slender dichotomous the extremities obtuse, vesicles elliptical solitary often wanting. — *Turn. Hist. Fuc. p.* 52. *E. Bot. t.* 1927. *Ag. Sp. Alg. v.* 1. *p.* 87. *Grev. Alg. Brit. p.* 17. — *F. nodosus*, γ. *Mackaii, Ag. Syst. Alg. p.* 275.

Sea-shore of Cunnemara, Ireland, *Mr. J. T. Mackay*. From Arisaig on the west coast of Ross-shire, to Kyle Scough in Sutherland, and on the eastern shores of the isles of Skye and of Lewis. ♃.— It is found among stones and on mud and sand, but apparently not growing there; collected into very dense tufts; the fronds 8—10 inches long. Fructification unknown.

6. F. *canaliculátus*, Linn. (*channelled Fucus*); frond linear channelled destitute of midrib and vesicles dichotomous emarginate at the extremities, receptacles terminal oblongo-cuneiform turgid bipartite obtuse. — *Turn. Syn. Fuc. p.* 242, *Hist. Fuc. t.* 3. *E. Bot. t.* 823. *Ag. Sp. Alg. v.* 1. *p.* 96. *Grev. Alg. Brit. p.* 18.

Abundant on rocks on the sea-shore. Summer and Autumn. ♃.— 6—7 inches long; well distinguished by its small grooved fronds.

"Cattle are exceedingly fond of this plant, and never fail to browze on it in winter, as soon as the tide leaves it within their reach. At this season it is peculiarly wholesome, as counteracting the costiveness induced by their ordinary straw-commons." *Carm.*

7. F. *tuberculátus*, Huds. (*tuberculated Fucus*); frond erect cylindrical dichotomous destitute of midrib and vesicles, receptacles terminal cylindrical. *Turn. Syn. Fuc. p.* 305, *Hist. Fuc. t.* 7. *Ag. Sp. Alg. v.* 1. *p.* 98. *Grev. Alg. Brit. p.* 18.—*F. bifurcatus, With.*

Rocky coasts of Cornwall; Ilfracombe; Bill of Portland and North of Ireland. Summer and Autumn. ♃.—Root somewhat creeping. Fronds olivaceous when fresh; when dry, hard, black and brittle.

5. HIMANTHÁLIA. *Lyngb.* Himanthalia.

Frond coriaceous, orbicular, peziziform. *Vesicles* none. *Receptacles* (frond-like) elongated, strap-shaped, compressed, dichotomously divided, springing from the centre of the frond, containing immersed tubercles furnished with a pore. *Grev. Alg. Brit. p.* 19. *t.* 3.—Name; ἱμας, αντος, a *strap,* and ἁλς, *the sea.*

This is indeed a very extraordinary production, if we are to look upon the peziziform base alone, in conformity with the opinion of Wahlenberg, Bory and Greville, as the frond; while the frond-like portion is all destined to produce the fructification. At any rate, no genus can be more distinct in the whole Order of Algæ.

1. H. *lórea*, Lyngb. (*strap-shaped Himanthalia*); frond subpyriform at length collapsing plano-concave stalked, receptacles repeatedly dichotomous linear slightly tapering at the extremity. *Grev. Alg. Brit. p.* 20. *t.* 3.—*Fucus loreus, Linn.*—*Turn. Syn. Fuc. p.* 246, *Hist. Fuc. t.* 196. *Ag. Sp. Alg. v.* 1. *p.* 98.

Rocky sea-shores, frequent. Winter and Spring. ⊙. (*Grev.*) ♃. (*Carm.*).—Receptacles, as they are here considered, from 2 to 10 feet long. The young fronds have a very curious appearance, before the receptacles appear. They are about an inch in length, densely clustered, obovate or turbinate, at length peziza-shaped, covering the rocks to a great extent, especially in the north. I have seen some, on exposed rocks in the Orkneys, swollen into a large, hollow, exactly sphærical, smooth, black ball, probably in consequence of the heat of the sun, rarifying and expanding the air within. Captain Carmichael, who could not have been aware of the views entertained upon this subject by Bory and Dr. Greville, has in his MSS. defined the Genus, "*frons* calyciformis stipitata, *receptacula* longissima dichotoma e disco emittens;" and farther adds, "I would not have ventured to give the above definitions of this genus, had I not found that the fronds, hitherto so called, drop off annually from the very base, and thus become identified with the receptacles of the Fucus, as mere fructification. The cup alone is perennial. The receptacles of the first year issue from its centre, but every part of the disk is equally capable of producing them, and it will be found, accordingly, that in old plants, they are always more or less excentric."

Tribe II. Lichineæ.

Marine plants, of a blackish-green colour, changing to deep black on exposure to the air, of a cartilaginous substance and fibrous texture. Frond flat or cylindrical, minute, branched in a dichotomous or subpalmated manner. Fructification terminal or nearly so, composed of capsules furnished with a pore, and filled with a colourless gelatinous mass of very fine filaments, among which pellucid oval or oblong seeds are disposed in many radiating moniliform series. Grev.

6. Lichína. *Ag.* Lichina.

Frond cartilaginous, blackish-green, dichotomous. *Fructification;* roundish *capsules* of the same colour, containing radiating moniliform lines of pellucid *seeds*, imbedded in a gelatinous mass of filaments. *Grev. Alg. Brit. p.* 21. *t.* 6.—Named from its similarity to some of the *Lichen* family, among which, indeed, Acharius had placed it.

1. L. *pýgmæa*, Ag. (*dwarf Lichina*); frond between flat and compressed, capsules globose. *Grev.—Ag. Sp. Alg. v.* 1. *p.* 105. *Hook. Fl. Scot. P. II. p.* 96. *Grev. Alg. Brit. p.* 22. *t.* 6, *Crypt. Fl. sub t.* 219. — *Fucus pygmæus, Lightf. Scot. p.* 964. *t.* 32. *Turn. Syn. Fuc. p.* 258, *Hist. Fuc. t.* 294. *f. a—h. E. Bot. t.* 1332.—*F. pusillus, Huds.*—*F. lichenoides, Good. et Woodw.*

On rocks which are exposed and almost dry at low water, frequent. Summer and Autumn. ♃.—About half an inch high. This and the following have almost the habit, but not the texture, of *Stereocaulon* among the *Lichens*.

2. L. *confínis*, Ag. (*least Lichina*); frond cylindrical, capsules terminal oval. *Grev.—Ag. Sp. Alg. v.* 1. *p.* 105. *Grev. Alg. Brit. p.* 23. *t.* 6, *Crypt. Scot. t.* 221.—*L. pygmæa, β. minor, Hook. Fl. Scot. P. II. p.* 96.—*Fucus pygmæus, β. minor, Turn. Hist. Fuc. t.* 204. *f. i—o.*—*Lichen confinis, Ach. Prodr.*—*E. Bot. t.* 2575.—*Stereocaulon confine, Ach. Meth.*

On rocks partially covered only at high tides, chiefly in Scotland. Dunbar. Ardthur, *Capt. Carmichael.* Caroline Park, *Dr. Greville.* Colvend, *Dr. Richardson*, &c.—Summer and Autumn. ♃.—My own observations have led me to consider this as a mere variety of the preceding, whose different appearance is due to a more frequent exposure to a dry atmosphere. Its height is scarcely 2 or 3 lines.

Tribe III. Laminariæ.

Plants all marine, of an olive-brown or olive-green colour, becoming somewhat darker on exposure to the air, varying from coriaceous to membranaceous. Frond with a lobed or fibrous root, more or less stipitate and forming a plane, entire or cleft expansion, in a few cases, furnished with one or more ribs. Vesicles none, (except in the genus Macrocystis,) *unless the hollow*

stem of some species be considered as such. Fructification, as far as hitherto known, either seeds mixed with a mass of vertical, jointed filaments, or roundish granules, without filaments; forming, in both cases, dense spreading spots or sori, on the surface of some part of the frond. Structure densely fibroso-cellular, without any appearance of reticulation. Grev.

7. Alária. *Grev.* Alaria.

Frond membranaceous, furnished with a percurrent, cartilaginous midrib, the stem pinnated with distinct leaflets. *Fructification;* pyriform *seeds,* vertically arranged in the incrassated leaflets. *Grev. Alg. Brit. p.* 25. *t.* 4.—Name; *ala,* a *wing,* from the winged base of the frond.

1. A. *esculénta,* Grev. (*esculent Alaria*); frond linear-ensiform entire at the margin, pinnæ linear-oblong fleshy.—*Grev. Alg. Brit. p.* 25. *t.* 4.—*Agarum esculentum, Bory.*—*Laminaria esculenta, Lyngb.*—*Ag. Sp. Alg. v.* 1. *p.* 110.—*Fucus escul. Lightf. Scot. p.* 938. *t.* 28. *E. Bot. t.* 1759. *Turn. Syn. Fuc. p.* 104. *Hook. in Fl. Lond. cum Ic.*

Coasts of England, Scotland and Ireland, especially in sheltered rocky bays. Winter and Spring. ⊙.—Frond 2—12 and even 20 feet long, of a greenish-brown colour. In Scotland it is known by the name of *Badder-locks,* and is eaten both by men and cattle; the former prefer the midrib, rejecting the more membranaceous portion.

8. Laminária. *Lamour.* Laminaria.

Frond coriaceous (rarely membranaceous), plane, expanded, without a midrib. *Fructification; seeds* or *granules* forming dense sori or spots, and imbedded in the thickened surface of some part of the frond. *Grev. Alg. Brit. p.* 27. *t.* 5.—Named from *lamina,* a *thin plate,* characteristic of the frond.

1. L. *digitáta,* Lamour. (*digitated Laminaria*); stipes woody cylindrical expanded at its apex into a cartilaginous flat roundish frond deeply cleft into numerous ensiform mostly simple segments.—*Ag. Sp. Alg. v.* 1. *p.* 112. *Grev. Alg. Brit. p.* 27. *t.* 5. —*Fucus digitatus, Linn.*—*Turn. Syn. Fuc. p.* 207, *Hist. Fuc. t.* 162. *E. Bot. t.* 2274.

Sea-shore, especially in deep water. ♃.—2—12 feet or more in length, olive-brown. Occasional specimens are found with the segments connected at the top, from which springs a new sessile frond. This is the *Tang* or *Tangle* of the Scotch; *Sea-girdles* of the English. The young frond is ovate or elliptical and entire, and then much resembles a small plant of *L. saccharina.*

2. L. *bulbósa,* Lamour. (*bulbous Laminaria*); root hollow swollen into a bulb-like form and tuberculated, stipes plane waved once-twisted at its base, expanded into a flat cartilaginous oblong or rounded frond, deeply cleft into numerous ensiform segments.—*Ag. Sp. Alg. v.* 1. *p.* 114. *Grev. Alg. Brit. p.* 29.

—*Fucus bulbosus, Huds.*—*Turn. Syn. Fuc. p.* 212, *Hist. Fuc. t.* 161. *E. Bot. t.* 1760.—*F. polyschides, Lightf.*

Sea-shore, in deep water. ♃.—Very variable in the outline of its frond, which when young is, like the last species, quite entire, and of so large a size that Mrs. Griffiths measured one which formed a circle of at least twelve feet in diameter. *Grev.*

3. L. *saccharína*, Lamour. (*sugary Laminaria*); root fibrous long and branching, stipes cylindrical expanding at its apex into a cartilaginous flat linear-oblong attenuated entire frond.—*Ag. Sp. Alg. v.* 1. *p.* 117. *Grev. Alg. Brit. p.* 32.—*Fucus saccharinus, Linn.*—*Turn. Syn. Fuc. p.* 198, *Hist. Fuc. t.* 163.—*β. bullata;* frond bullate in the centre, the margins waved. *Turn.*—*F. sacchar., E. Bot. t.* 1376.—*γ. latifolia;* stipes short cylindrical expanding into an ovato-elliptical submembranaceous undivided frond. *F. sacchar. var. latissima, Turn.*—*Laminaria latifolia, Ag. Syst. Alg. v.* 1. *p.* 119. *Grev. Alg. Brit. p.* 31.—*Ulva maxima, Gunn. Fl. Norv.* 2. *t.* 7. *f.* 5.

Abundant on all the shores of Britain.—*β.* Scotland.—*γ.* Among rejectamenta at Yarmouth, *Mr. Mason.* Firth of Forth and Isle of Bute. *Dr. Greville.* ♂?—This well known plant attains a length of many feet, and derives its specific name from its being, after having been steeped in fresh water and exposed to the sun, covered with a white efflorescence resembling sugar, but nauseous to the taste. It is not the "saccharine Fucus" of the Icelanders, as has been generally supposed: nor do I think it is eaten at all by the natives of that country. It is said, however, to be eaten in England by the poor, boiled as a potherb; but I know not whether this has been asserted by any person besides Pallas. Thunberg tells us, that in Japan it is prepared in such a manner as to be quite esculent, and that it is customary there, when presents are made, to lay upon them a slice of this Fucus attached to a piece of paper folded in a curious manner, and tied with threads of gold or silver. Cattle eat it not unfrequently. The var. *γ.*, Dr. Greville has, following Agardh, made a distinct species; not however without expressing his doubts as to the propriety of so doing.

4. L. *Phyllítis*, Lamour. (*thin-leaved Laminaria*); root fibrous branched, stipes somewhat compressed expanding at its apex into a thin membranaceous linear-lanceolate frond.—*Ag. Sp. Alg. v.* 1. *p.* 121. *Grev. Alg. Brit. p.* 34.—*L. saccharina var. attenuata, Grev. Fl. Edin. p.* 282.—*Fucus Phyllitis, Stackh. Ner. Brit.*—*Turn. Syn. Fuc. p.* 193, *Hist. Fuc. t.* 164. *E. Bot. t.* 1331.

On the stems of the larger marine Algæ, in several parts of England, Ireland and Scotland. ♂.—The smaller size, thin and membranaceous frond tapering at the base, are the characters by which this species is distinguished from *L. saccharina.*

5. L. *débilis*, Ag. (*delicate Laminaria*); root minute scarcely fibrous, stipes extremely short slender expanding into a broadly oblong membranaceous frond cuneate at the base.—*Ag. Sp. Alg.* 1. *p.* 120. *Grev. Alg. Brit. p.* 35. *t.* 5.—*L. papyrina, Bory.*

Shores of the island of Islay, one of the southern Hebrides, *James Chalmers.* ⊙.—In length from 2 to 8 or 10 inches, obtuse, sometimes almost obovate, of a thin and flaccid texture, with an extremely short stipes.

Tribe IV. Sporochnoideæ.

Plants all marine, of an olivaceous or yellowish-green colour, not changing to black in drying; of a cartilagineo-membranaceous substance, becoming flaccid almost immediately after exposure to the air, in some cases acquiring, under such circumstances, a verdigris-green colour, and then possessing the property of rapidly decomposing other delicate Algæ in contact with them. Frond with a scutate (rarely tomentose) root, flat, compressed or cylindrical, with distichous (rarely irregular) branches, and bearing in most species, at some period of their growth, little pencil-like deciduous tufts of fine green filaments. Fructification, so far as it is known, composed of club-shaped, moniliform, radiating filaments, either forming sessile warts, or arranged concentrically in little, stalked, club-shaped bodies, terminated by pencils of delicate fibres. Grev.

9. Desmarestia. *Lamour.* Desmarestia.

Frond cartilaginous, plane or compressed, distichously branched, while young furnished with marginal deciduous tufts of fine green filaments, the branches set with marginal spines. *Grev. Alg. Brit. p.* 36. *t.* 5.—Named in compliment to *A. G. Desmarest*, a celebrated French naturalist.—The *fructification* is unknown.

1. D. *liguláta*, Lamour. (*ligulate Desmarestia*); frond elongated plane with an obscure midrib 3—4 times pinnate, the pinnæ and pinnulæ opposite linear-lanceolate attenuated at the base.—*Grev. Alg. Brit. p.* 37. *t.* 5.—*Sporochnus ligul., Ag. Sp. Alg. v.* 1. *p.* 158.—*Desmia ligul., Lyngb.*—*Fucus ligul., Lightf. Scot. p.* 946. *t.* 29. *Turn. Syn. Fuc. p.* 99, *Hist. Fuc. t.* 96. *E. Bot. t.* 1636.

Principally on the southern and south-western shores of England. Firth of Forth and Orkney, *Rev. C. Clouston.* Miltown Malbay, Ireland, *Mr. Harvey.* ⊙. Summer.—Two to 5 or 6 feet in length; colour a pale olive-green. Dr. Greville mentions Mr. Turner's var. *dilatata*, with the frond nearly 4 lines broad, as being found in Orkney by *Mr. Clouston.*

2. D. *aculeáta*, Lamour. (*aculeated Desmarestia*); stem short rounded bearing numerous filiform flattened branches which are again divided in a pinnated manner, the pinnules with distichous spines.—*Grev. Alg. Brit. p.* 38. *t.* 5. *f.* 2, 3.—*Sporochnus aculeatus, Ag. Sp. Alg. v.* 1. *p.* 151.—*Desmia aculeata, Lyngb.*—*Fucus aculeatus, Linn.*—*Turn. Syn. Fuc. p.* 262, *Hist. Fuc. t.* 187. *E. Bot. t.* 2445.

Sea-shore, frequent. ♃.—The young plants are flaccid, and furnished with tufts of hairs arranged in a distichous manner, which, falling off, are succeeded by spines: old plants are harsh and rigid.

10. Dichlória. *Grev.* Dichloria.

Frond cylindrical, filiform, cartilaginous, pinnated with opposite branches, becoming flaccid and of a verdigris-green colour on exposure to the air. *Fructification* unknown. *Grev. Alg. Brit. p.* 39. *t.* 6.—Name; δις, *twice*, and χλωρις, *green*, "in allusion to its singular change of colour."

1. D. *víridis*, Grev. (*green Dichloria*). *Grev. Alg. Brit. p.* 39. *t.* 6.—*Sporochnus viridis*, *Ag. Sp. Alg. v.* 1. *p.* 154.—*Chordaria viridis*, *Ag. Syn. Alg. Scand. p.* 14.—*Gigartina viridis*, *Lyngb.*—*Desmarestia viridis*, *Lamour.*—*Fucus viridis*, *Fl. Dan. t.* 886. *Turn. Syn. Fuc. p.* 397, *Hist. Fuc. t.* 97. *E. Bot. t.* 1669.

Sea-coast, on rocks and on the larger Algæ, in various parts of England and Ireland, and in Scotland, both on the east and on the west coast (*Capt. Carmichael*). ⊙. Summer.—This is one of the most beautiful and slenderest of the inarticulated Algæ. One or two feet or more long, much divided in a pinnated manner, with dense capillary and mostly long branches, of an olive-green colour, inclining to orange in age, verdigris-green when exposed (while recent) to the air.

11. Sporóchnus. *Ag.* Sporochnus.

Frond filiform, cylindrical or compressed, cartilagineo-membranaceous. *Fructification;* club-shaped, moniliform *filaments*, radiating in scattered warts, or concentrical in distinct (mostly clavate, stalked) *receptacles*, often terminated by a deciduous tuft of filaments. *Grev. Alg. Brit. p.* 40. *t.* 6.—Name, σπορος, a *seed* or *sporule*, and χνοος, *wool*, from the tuft of filaments, with which the fructifications are often terminated.

1. S. *pedunculátus*, Ag. (*pedunculated Sporochnus*); frond filiform with long slender branches pinnated with clavate receptacles terminated by a deciduous tuft of articulated filaments.—*Ag. Sp. Alg. v.* 1. *p.* 149. *Grev. Alg. Brit. p.* 41. *t.* 6.—*Gigartina pedunc.*, *Lamour.*—*Fucus pedunc.*, *Huds.*—*E. Bot. t.* 345. *Turn. Syn. Fuc. p.* 367, *Hist. Fuc. t.* 188.

Marine rocks in various parts of England. Preston Pans, Scotland. ⊙. Summer and Autumn.—Colour yellowish-grey.

2. S. *villósus*, Ag. (*hairy Sporochnus*); frond filiform, branches pinnated with opposite pinnæ and nodose with numerous whorls of dense branched filaments.—*Ag. Sp. Alg. p.* 155. *Grev. Alg. Brit. p.* 42.—*Conferva villosa*, *Huds.*—*E. Bot. t.* 546. *Dillw. Conf. t.* 37.

Marine rocks, on the same coast with the last: and at Ardthur, Argyleshire, *Captain Carmichael.*—A beautiful species. Mr. Hasell, who found it with the preceding in the Firth of Forth, observes of it that

" fresh specimens, when spread upon paper, rendered it transparent as if it had been touched with oil, but in a short time this transparency disappeared."

3. S. *rhizódes*, Ag. (*root-like Sporochnus*); frond rather stout filiform with subdichotomous branches covered with numerous warts of fructification.—*Ag. Sp. Alg. v.* 1. *p.* 156.—*Chondria rhizodes, Ag. Syn. p.* 15. *Lyngb. Hydroph. Dan. t.* 13. *et C. paradoxa ejusd. t.* 14.—*Fucus rhizodes, Turn. Hist. Fuc. t.* 235.—*Conferva verrucosa, E. Bot. t.* 1688.

In the sea, parasitic on other Algæ, on the south coasts of England and Ireland. ⊙. Summer.

Tribe V. Chordarieæ.

Plants all marine, of an olive-green colour, becoming darker on exposure to the air; of a cartilaginous and lubricous substance. Root scutate. Frond continuous, cylindrical, filiform, composed of a solid cellular centre and a dense exterior mass of concentrical filaments. Fructification imperfectly known. Grev.

12. Chordária. *Ag.* Sea-Whipcord.

Frond filiform, cartilaginous, solid, continuous, composed exteriorly of a stratum of concentrical filaments. *Grev. Alg. Brit. p.* 44. *t.* 7.—Named from *Chorda*, a *cord* or *string*, consequently much too like the following and older Genus *Chorda*. Our *C. flagelliformis*, the type of the present Genus, my valued friend Mr. Harvey is inclined to place with the *Batrachospermeæ* in the *Confervoideæ;* but I rather follow Dr. Greville in retaining it among the "*Inarticulatæ*," with which the internal structure and texture of the stem most accords.

1. C. *flagellifórmis*, Ag. (*common Sea-Whipcord*); frond throughout equal filiform branched, branches long mostly simple and distichous, seeds naked among the concentrical filaments.—*Ag. Syn. p.* 12. *Sp. Alg. v.* 1. *p.* 166. *Grev. Alg. Brit. p.* 44. *t.* 7. —*Gigartina flagell., Lamour.*—*Fucus flagell., Fl. Dan. t.* 650. *Turn. Syn. Fuc.* p. 335, *Hist. Fuc. t.* 85. *E. Bot. t.* 1222.

Sea-coast, on rocks and stones. ⊙. Summer.—1—3 feet long, very slender, olive-brown, almost black when dry. "Fructification," according to *Capt. Carmichael*, "external, consisting of obovate brown sporidia, mixed with clavate jointed filaments, covering the whole surface of this frond."—The same acute observer remarks, that there is little or no vestige of the filaments in the young plants, and their development appears to keep pace with that of the sporidia.

Tribe VI. Dictyoteæ.

Plants all marine, of an olive-green colour, not changing on exposure to the air, of a membranaceous flexible substance (rarely cartilaginous) and reticulated structure. Root either naked and

scutate or composed of a mass of woolly filaments. Frond cylindrical or flat; when flat, nerveless (except in Haliseris), *thin, entire or divided, often flabelliform. Fructification; roundish-ovate, pear-shaped or club-shaped seeds, enveloped in a pellucid case, covering the surface, or scattered, or forming minute spots or transverse lines. The seeds in most cases are produced beneath the epidermis, through which they burst, and become prominent. Grev.*

13. Chórda. *Stackh.* Sea Whip-lash.

Frond simple, filiform, cylindrical, with an interrupted cavity. *Root* naked, scutate. *Fructification;* external continuous masses of pear-shaped *seeds*, fixed by their base. *Grev. Alg. Brit. p.* 46. *t.* 7.—Name, *chorda*, a *cord.*

1. C. *Fílum,* Lamour. (*common Sea Whip-lash*); frond cartilaginous slimy cylindrical filiform attenuated at both extremities internally jointed externally not regularly constricted, spirally twisted when old.—*Lamour.—Hook. in Fl. Lond. N. S. cum Ic. Grev. Alg. Brit. p.* 47. *t.* 7.—*Scytosiphon Filum, Ag. Sp. Alg. v.* 1. *p.* 161.—*Fucus Filum, Linn.—Turn. Syn. Fuc. p.* 339, *Hist. Fuc. t.* 96. *E. Bot. t.* 2487.—*β. Thrix;* frond very slender almost capillary, 2—4 inches in length. *Grev.—Fucus Thrix, Stackh. Ner. Brit. t.* 12.

Abundant on the rocky shores of Great Britain, often in deep water. ⊙. Summer and Aut.—From 1—20 feet long, "composed of a simple fillet, one or two lines in breadth, spirally twisted into a filiform tube, formed by the cohesion of its edges" (*Carm.*,) olive-brown, covered with slimy, minute, conferva-like hairs. *Fructification* covering the surface of old fronds with the pyriform seeds. Capt. Carmichael has likewise found another kind of fructification, represented in the Flora Londinensis and consisting of sessile, ovate capsules, scattered among clavate articulated filaments.

2. C. *lomentária*, Grev. (*jointed Sea Whip-lash*); frond membranaceous, the transverse septa remote and at irregular intervals accompanied with external constrictions, the interval somewhat inflated.—*Lyngb. Hydroph. Dan. p.* 74. *t.* 18. *Grev. Alg. Brit. p.* 48.—*Scytosiphon Filum, var. γ. Ag. Sp. Alg. v.* 1. *p.* 162.

Rocks and stones in the sea; frequent in Devonshire, *Mrs. Griffiths.* Near Belfast, *Dr. Drummond.* Miltown Malbay, *Mr. Harvey.* Abundant both on the western and eastern coasts of Scotland, *Dr. Greville.* ⊙. Summer and Aut.—3—16 inches long; spurious dissepiments, occasioning the apparent internal articulation, are at very unequal and generally considerable distances from each other, externally constricted in those places. Dr. Greville describes the fructification as interrupted masses of cylindrical or somewhat clavate filaments, which are in pairs; each pair of filaments being connected by their bases.

14. Asperocóccus. *Lamour.* Asperococcus.

Frond (simple) tubular, cylindrical or compressed, continu-

ous, membranaceous. *Root* minutely scutate, naked. *Fructification;* distinct spots composed of imbedded *seeds,* mixed with erect, club-shaped filaments. *Grev. Alg. Brit. p.* 49. *t.* 9. —Name;—a barbarous compound of Latin and Greek which ought not to be tolerated; *asper* signifying *rough,* and κοκκος, a *seed,* from the rough surface occasioned by the seeds.

1. A. *fistulósus, (fistulose Asperococcus);* frond elongated cylindrical filiform tapering at the base subgelatinous contracted here and there.—*Asperococcus echinatus, Grev. Alg. Brit. p.* 50. *t.* 9.—*A. rugosus, Lamour.*—*Encælium echinatum, Ag. Sp. Alg. v.* 1. *p.* 145.—*E. Lyngbyanum, Grev. Crypt. Fl. t.* 290.—*Scytosiphon fistul., Lyngb.*—*S. Filum, var. fistulosus, Ag. Sp. Alg. v.* 1. *p.* 163.—*Ulva. fistul., Huds.*—*E. Bot. t.* 642.—*Conferva fistul., Roth.*

Rocks on the sea-shore, England, Scotland and Ireland; not unfrequent. ⊙ Summer and Aut.

2. A. *castáneus, (red-brown Asperococcus);* frond filiform compressed coriaceous red-brown attenuated at both extremities. —*Scytosiphon castaneus, Carm. MSS.*

On the leaves of *Zostera,* coast of Appin, abundantly, *Capt. Carmichael.* Colvend, Dumfries-shire, *Dr. Richardson.* ⊙. Spring.—Fronds gregarious, 4—9 inches long, and scarcely half a line in diameter, attenuated at both ends, regularly compressed, of a firm substantial texture and deep chestnut colour. No fructification has been detected on it.—I have no doubt that this is a distinct species from *A. fistulosus,* with which alone there is any chance of its being confounded. Besides being compressed, its texture is much firmer and more substantial, and its colour deeper. *Carm. MSS.*

3. A.? *pusíllus, (least Asperococcus);* frond rounded capillary spuriously articulated brown. *Carm. MSS. cum Ic.*

On *Chorda Filum,* Appin, abundantly, *Captain Carmichael.* Meadfoot, Devonshire, *Mrs. Griffiths.* ⊙. Autumn.—The fronds of this diminutive species are so closely aggregated as to give to a section of the plant on which they grow, the appearance of a bottle-brush. They are from 1 to 2 inches long, simple, the thickness of horse-hair, attenuated at both ends, transversely striated in imitation of joints and closely beset with pellucid fibres. *Carm. MSS.*

4. A. *Turnéri, (Turnerian Asperococcus);* frond oblong cylindrical obtuse attenuated at the base thin and membranaceous. *A. bullosus, Lamour.*—*Grev. Alg. Brit. p.* 51.—*Encælium bullosum, Ag. Sp. Alg. v.* 1. *p.* 146.—*Ulva Turneri, E. Bot. t.* 2570. —*Gastridium Opuntia, Lyngb. Hydroph. Dan. t.* 18.

Rocks on the sea-coast of Sussex, *Mr. Borrer.* Sidmouth, *Mrs. Griffiths.* Bantry, Ireland, *Miss Hutchins.* Appin, *Capt. Carmichael.* ⊙. Summer.—Mrs. Griffiths remarks of this plant, that it is not very conspicuous when growing in the water. The cavity being filled with that fluid and the substance thin and transparent, it appears to be of the colour of the water itself, and therefore not easily seen, unless the light be cast upon it in a particular manner. (*Grev.*)—I venture to retain the Engl. Botany specific name of this plant. It was published

as Dr. Greville observes " as nearly as possible at the same time with that of Lamouroux, 1813;" and, being a compliment to our greatest British Algologist, should have the preference.

5. A. *compréssus*, (*compressed Asperococcus*); frond flat thickened at the edges rather short attenuated at both extremities here and there slightly contracted gelatinous.—*A. compressus*, *Mrs. Griffiths' MSS.*

Rocks on the south coast of England, rare. Meadfoot, Sidmouth and Torquay, *Mrs. Griffiths.* ⊙. Summer.—To Mrs. Griffiths is entirely due the merit of discovering and distinguishing this Alga, which is from 3 to 6 inches in height and from 3 lines to nearly an inch in diameter, " tender and gelatinous in all stages, *always flat*, but consisting of a double membrane united at the edges, which, when the plant is fresh, are considerably thickened: there is not the slightest tendency to be tubular or inflated."—The larger fronds are often invested with a parasite, apparently a young *Entermorpha* and with *Ceramium diaphanum*. This plant may, as Mrs. Griffiths observes, be considered intermediate between *Asperococcus* and *Punctaria*.

15. Punctária. *Grev.* Punctaria.

Frond simple, membranaceous, flat, with a naked scutate root. *Fructification* scattered over the whole frond in minute distinct spots, composed of roundish prominent *seeds*, intermixed with club-shaped filaments. *Grev. Alg. Brit. p. 52. t. 9.*—Name derived from the Latin (contrary to a Linnæan axiom, though a practice sanctioned by many eminent Botanists besides the author of this Genus) *punctum*, a *dot;* the numerous fructifications exhibiting a dotted appearance.

1. P. *plantagínea*, Grev. (*plantain-leaved Punctaria*); frond coriaceo-membranaceous attenuated at the base into a short stipes reddish-brown.—*Grev. Alg. Brit. p. 53. t. 9.*—*Zonaria? plantaginea*, *Ag. Sp. Alg. v. 1. p. 138.*—*Ulva plantaginea*, *Roth.*—*E. Bot. t. 2136. Lyngb. Hydroph. Dan. p. 31. t. 6.*

Marine rocks, Sidmouth and Torbay, *Mrs. Griffiths.* Near Belfast, *Dr. Drummond.* ⊙. April, May.—Of this fine species I possess excellent specimens from Mrs. Griffiths, 6—10 inches long; that lady describes them to be " of a thick, gelatinous (hence shrinking much in drying) and tender substance, yet brittle, breaking when bent without great care; every where covered with short hair-like fibres which give it a satiny feel." She rightly distinguishes it from the preceding, which (independent of its different outline) is " thin, membranaceous, leathery, smoother and with a different fructification." In the present species, Dr. Greville, who had the opportunity of examining specimens in a recent state, says the " fructification represents minute dots, scattered over the whole surface, composed of roundish seeds intermixed with linear-elliptical, articulated, short filaments, filled with a dark reddish mass."

2. P. *latifólia*, Grev. (*broad-leaved Punctaria*); frond olivaceous thick subgelatinous tender oblong or obovate suddenly tapering into a very short stipes.—*Grev. Alg. Brit. p. 52.*

Rocks and stones in the sea, principally on the south coast of England; Sussex, Falmouth, Dawlish. Meadfoot and Sidmouth, *Mrs. Griffiths.* Cromer, *Mr. Turner.* Near Belfast, *Dr. Drummond.* Firth of Forth, *Dr. Greville.* ⊙. Summer.

3. P. *tenuíssima*, Grev. (*delicate Punctaria*); frond sublinear very thin transparent. — *Grev. Alg. Brit. p.* 54. — *Zonaria? tenuissima, Ag. Syst. Alg.* 268. — *Zonaria? plantaginea, var. tenuior, Ag. Sp. Alg. v.* 1. *p.* 138. — *Ulva plantaginea, var. tenuior, Lyngb. Hydroph. Dan. p.* 31. *t.* 6.

Parasitic on *Zostera marina*, frequent on the coasts of the Isle of Bute, *Dr. Greville.* Appin, *Captain Carmichael.* — "Two to 8 inches in length. Substance exceedingly thin and transparent, highly and beautifully reticulated, slightly lubricous. Fructification unknown." *Grev.*

16. Striária. *Grev.* Striaria.

Frond filiform, tubular, continuous, membranaceous, branched. *Root* naked and scutate. *Fructification;* groupes of roundish *seeds*, forming transverse lines. *Grev. Alg. Brit. p.* 54. *t.* 9. — Named from the transversely striated appearance, caused by the lines of fructification. "It is distinguished from the preceding Genus, by its tubular or branched frond, and by the uniformly transverse disposition of the groupes of seeds. From the following it differs in the last named character and in the more highly reticulated structure."

1. S. *attenuáta*, Grev. (*attenuated Striaria*). *Grev. Crypt. Fl.* (*Synopsis,*) *p.* 44. *Alg. Brit. p.* 55. *t.* 9. — *Carmichaelia attenuata, Grev. Crypt. Fl. t.* 288.

In the sea, on various Algæ; Appin, *Capt. Carmichael.* Shores of Bute, *Dr. Greville.* Belfast Lough, *Dr. Drummond.* ⊙. Summer. — "Frond 3—12 inches in height, less than a line in diameter, much branched, the branches elongated, attenuated at both extremities, mostly opposite, pale olivaceous green."

17. Dictyosíphon. *Grev.* Dictyosiphon.

Frond filiform, tubular, continuous, branched. *Root* minutely scutate, naked. *Fructification;* ovate scattered *seeds*, lying beneath the epidermis. *Grev. Alg. Brit. p.* 55. *t.* 8. — Name; δικτυον a *net*, and σιφων, a *tube*, from the tubular and reticulated frond.

1. D. *fæniculáceus*, Grev. (*fennel-leaved Dictyosiphon*). *Grev. Alg. Brit. p.* 56. *t.* 8. — *Scytosiphon fænicul., Ag. Sp. Alg. v.* 1. *p.* 164. — *Conferva fænicul., Huds.* — *Fucus subtilis, Turn. Hist. Fuc. t.* 234.

In basins of water left by the receding of the tide; upon *Chorda Filum* and other *Algæ;* frequent on the western coasts and isles of Scotland, and in the Firth of Forth, *Dr. Greville.* In Anglesea, *Dillenius.* Cornwall, *Hudson.* Bantry Bay, *Miss Hutchins*, and Belfast, *Dr. Drummond.* ⊙. Spr. and Summer. — "One to many feet long, much branched

with conferva-like (but not jointed) branches, of an olive-brown colour. Branches much elongated and attenuated, except the ultimate ramuli, which are short and remarkably slender. Substance slightly gelatinous, so as to adhere to paper. Fructification, scattered seeds, slightly imbedded in the frond."—From the MSS. of Capt. Carmichael, who has examined this plant with much care in a recent state, I extract the following remarks. — " Fronds gregarious, about the thickness of a bristle, chesnut-coloured, repeatedly branched, branches patent at the base, and beset with tapering flexuose ramuli ; the latter often transversely striated as if jointed. Fructification unknown to me, and I should suppose exceedingly rare, for I have examined hundreds of specimens in vain in search of it. This plant is always more or less clothed with conferva-like hairs, but these are so far from furnishing any aid to a specific character, that there are very few of the smaller *Thalassiophytæ* without them. It varies prodigiously in length, ranging from one to fifteen feet, the latter proved by actual measurement."

18. Dictyóta. *Lamour.* Dictyota.

Frond flat, highly reticulated, membranaceous, dichotomous or irregularly cleft (palmato-flabelliform in *D. atomaria*). *Root* a mass of woolly filaments. *Fructification* composed of scattered, or variously aggregated, somewhat prominent *seeds*, on both surfaces of the frond. *Grev. Alg. Brit. p.* 57. *t.* 10.— Name, δικτυον, a *net;* the fronds, as in the preceding Genus, appearing reticulated when magnified.

1. D. *dichótoma*, Lamour. (*dichotomous Dictyota*) ; frond olive-green linear dichotomously divided, seeds singly scattered or in small irregular clusters. — *Grev. Alg. Brit. p.* 57. *t.* 10.— *Zonaria ? dichot., Ag. Sp. Alg. v.* 1. *p.* 133. — *Ulva dichot., Huds.*—*E. Bot. t. t.* 774.—*β. intricata ;* frond very narrow much branched twisted and entangled. *Grev.* — *Zonaria ? dichot., β. intricata, Ag. Sp. Alg. v.* 1. *p.* 134.

In the sea, on the larger Algæ and on stones; not unfrequent.—*β.* Shore near Dumfries, *Dr. Richardson.* Plymouth, *Mr. Sconce.* ☉. Summer.— Besides the scattered single seeds on this plant, Mrs. Griffiths finds, at Sidmouth, other specimens " covered with transparent vesicles rising above the surface : as they advance in age, a line of dark grains appears within them, and they at length are filled with capsules, which form groupes, and rise above the surface when ripe. In this state they are extremely rare." [1]

2. D. *atomária*, Grev. (*sprinkled Dictyota*) ; frond olive-brown palmato-flabelliform or cuneate irregularly cleft and laciniated, seeds forming waved transverse lines with intermediate scattered ones. *Grev. Alg. Brit. p.* 58.—*D. zonata* and *D. ciliata, Lamour.*— *Zonaria atomaria, Ag. Sp. Alg. v.* 1. *p.* 128. — *Ulva atomaria, Woodw.* — *E. Bot. t.* 419.

Marine rocks, chiefly on the east and south of England, as at Cromer, Corton and Gunton ; Sidmouth, Torquay and Ilfracombe (*Mrs. Griffiths*).

[1] Mrs. Griffiths further observes, that there is a mistake in Dr. Greville's *Algæ Britannicæ* (p. 58.) ; as " it was the *clusters* and *vesicles* that were first found by me in 1822, and not ' *single seeds,*' as there printed."

Wormshead, Glamorgan, *L. W. Dillwyn, Esq.* Rare in the Firth of Forth, *Dr. Greville.* ☉. Summer.

19. Cutléria. *Grev.* Cutleria.

Frond plano-compressed, cartilagineo-membranaceous, subflabelliform, irregularly cleft. *Root* a mass of woolly filaments. *Fructification;* minute tufts of *capsules,* scattered on both sides of the frond, the capsules pedicellate, containing several distinct *granules. Grev. Alg. Brit. p.* 59. *t.* 10.—Named in compliment to *Miss Cutler* of Sidmouth, the discoverer of *Grateloupia filicina* in Britain, a lady zealously devoted to the study of marine Botany.

1. C. *multífida,* Grev. (*multifid Cutleria*). *Grev. Alg. Brit. p.* 60. *t.* 10.—*Zonaria multifida, Ag. Sp. Alg. v.* 1. *p.* 135.—*Ulva multifida, E. Bot. t.* 1913.—*Dictyota penicillata, Lamour.*

Cast on shore on Yarmouth beach, *Messrs. Turner and Wigg.* ☉. August.—Frond of an olive-brown colour and cartilagineo-membranaceous texture, but adhering to paper when dry, broadly flabelliform, cut nearly to the base into 3—5 cuneate primary segments, and those again copiously divided into numerous, irregular, but more or less linear ones. Fructification scattered over both surfaces of the frond, consisting of clavate pedicellate capsules, arranged in small clusters. These capsules Dr. Greville aptly compares to the little black *Fungus* so common on rose-bushes in gardens, the *Phragmidium mucronatum, Link.*

20. Padína. *Adans.* Padina.

Frond flat, highly reticulated, subcoriaceous, flabelliform, mostly undivided, marked with concentric lines. *Root,* a mass of woolly filaments. *Fructification;* ovate, blackish *seeds,* fixed by their base, bursting through the epidermis in compact, concentric lines (rarely spots), mostly on one surface of the frond. *Grev. Alg. Brit. p.* 61. *t.* 10.—Name of uncertain origin, as is the case with many of Adanson's Genera.

1. P. *Pavónia,* Lamour. (*Peacock's tail Padina*); fronds broadly flabelliform entire or dichotomously divided, the segments equally flabelliform, with numerous concentric lines of fructification white and somewhat powdery beneath, the margin revolute and fringed. *Grev. Alg. Brit. p.* 62. *t.* 10.—*Zonaria Pavonia, Ag. Sp. Alg. v.* 1. *p.* 125.—*Ulva Pavonia, Linn.*—*E. Bot. t.* 1276.

Rocks on the extreme southern shores of England, as Devonshire and Dorsetshire (hence I am led to doubt the correctness of the station of "Aberdeen," given in Lightfoot's Flora Scotica, on the authority of *Dr. Cargill*). ♃.—One of the most beautiful and singular of our Algæ.

2. P. *deústa,* (*dark brown Padina*); fronds subcoriaceous deep brown reniform or orbicular lobed glabrous scarcely reticulated, attached by the whole surface beneath, concentric lines of the same colour obscure.—*Zonaria deusta, Ag. Sp. Alg. p.* 132. *Lyngb. Hydroph. Dan. p.* 19.—*Fucus deust., Fl. Dan. t.* 420.

Marine rocks at Appin, Argyleshire, *Capt. Carmichael.* Miltown Malbay, Ireland, *Mr. Harvey.* Slaty and sandstone rocks near high-water mark in Berwick Bay, *Dr. Johnston.*—An inch to an inch and a half broad, the specimens often imbricated, deep rich brown, opaque. This has, at the first appearance, a close affinity with *P.* (Zonaria, Ag.) *squamaria* from the Mediterranean, where the fronds are often equally orbicular, but they are woolly beneath, the substance is thinner, less opaque, and the concentric lines are very evident. *P. deusta* had hitherto been considered a native only of the extreme northern regions. "Fronds gregarious, coriaceous, opaque, of a brownish purple colour, and marked with concentric striæ or zones, about an inch in diameter, suborbicular, flat, and adhering firmly throughout the whole lower surface, but separating without much difficulty. Fructification unknown." *Carm.* "Thin slices," Mr. Harvey observes, of this plant, "placed under a high power of the microscope, appear closely cellular, with irregular polygonal meshes or cellules, for there is no regular reticulation, like that of others of the Genus. This species is often papillose, and much resembles a *Thelephora.* I believe it belongs to a distinct genus, of which I doubt not there are many species often overlooked as crustaceous zoophytes."

3. P. *párvula*, Grev. (*small Padina*); frond resupinate suborbicular membranaceous deeply lobed, lobes orbicular somewhat imbricated, scarcely at all marked with concentric lines. *Grev. Crypt. Fl. t.* 360, *Alg. Brit. p.* 63.

Rocks in the sea, near Sidmouth, *Dr. Greville.* Rocks near low-water mark, Miltown Malbay, Ireland, rare, *Mr. Harvey.* ☉. March.—I have not seen English specimens of this plant. Mr. Harvey, who communicated his Irish specimens to me, observes in a letter, "Since I have become possessed of the Cryptogamic Flora, I find by Dr. Greville's figures, that the reticulation on our plant is different; yet they quite accord in habit, resembling a *Marchantia*, creeping by its white radicular fibres over a space of a foot or more in extent; sometimes very closely attached to the rock, at others comparatively loose. In structure, both plants are true *Dictyoteæ.* The reticulation in my plant is less regular than in Dr. Greville's, and the meshes are shorter than they are broad. If distinct, I propose to call mine *P. decumbens.*"

21. Halíseris. *Tozzetti.* Haliseris.

Frond flat, linear, membranaceous, with a midrib. *Root* a mass of woolly filaments. *Fructification;* ovate *seeds*, forming distinct *sori* or groupes (mostly arranged in longitudinal lines). *Grev. Alg. Brit. p.* 63. *t.* 8.—Name, αλς, αλις, the *sea*, and σεριις, *endive;* signifying *sea-endive.*

1. H. *polypodioídes*, Ag. (*Polypodium-like Haliseris*); frond dichotomous obtuse entire at the margin, seeds solitary and scattered over the frond or arranged in oblong clusters parallel to and near the midrib. *Ag. Sp. Alg. v.* 1. *p.* 142.—*Fucus polypodioid., Lamour.—F. membranaceus, Stackh. Ner. Brit. t.* 6. *Turn. Syn. Fuc. p.* 141, *Hist. Fuc. t.* 87. *E. Bot. t.* 1758.

Rocks in the sea, Torbay and Sidmouth, *Mrs. Griffiths.* Cornwall, *Mr. Rashleigh.* Shields beach, *Mr. Winch.* Opposite Quilty Strand, at extreme low-water mark, Miltown Malbay, Ireland, rare, *Mr. Harvey.*

—This beautiful and delicate plant is from 6 inches to a foot in height, of an olive-green colour; its tender frond often obliquely jagged and torn at the margin, like an old leaf of *Banana*. I am indebted to Mrs. Griffiths for numerous specimens with the fructifications above noticed, and for a third state, with incipient capsules, apparently in small clusters, and enclosed in isolated, irregular, pale blotches, surrounded by a dark wavy line. Dr. Greville correctly observes that this species is proliferous, the young plants arising from very near the midrib; and, also, that when recent, it has an extremely powerful and disagreeable smell.

Tribe VII. Furcellarieæ.

Marine plants, of a dull dark-purplish or brownish-red colour, changing to black on exposure to the air. Substance cartilaginous. Structure cellular, with a dense coloured stratum of horizontal filaments forming the circumference. Root creeping. Frond cylindrical, filiform, dichotomous. Fructification terminal, composed of pod-like indehiscent receptacles, within which is imbedded, near the circumference, a horizontal circular stratum of dark-brown oblong pear-shaped seeds. Grev.

22. Furcellária. *Lamour.* Furcellaria.

Frond cartilaginous, cylindrical, filiform, dichotomous. *Fructification;* terminal, elongated, pod-like *receptacles*, containing a stratum of dark, oblong pear-shaped *seeds* in the circumference. *Grev. Alg. Brit. p.* 67. *t.* 11.—Name; *furcula* or *furcilla*, a *little fork;* from the forked or dichotomous ramifications.

1. F. *fastigiáta*, Lamour. (*fastigiated Furcellaria*). *Ag. Sp. Alg. v.* 1. *p.* 103. *Grev. Alg. Brit. p.* 67. *t.* 11.—*F. lumbricalis, Lamour.—Lyngb.—F. fastigiatus, Huds.—F. lumbricalis, Gmel. —Turn. Syn. Fuc. p.* 317., *Hist. Fuc. t.* 6. *E. Bot. t.* 894.

Rocky sea-shores, frequent. ♃. ? *Fr.* in the winter months. *Grev.*—6—9 inches long, purplish-brown; apices blunt. In *var.* β. of Mr. Turner, the apices are compressed, transparent, ovato-lanceolate, short, acute, and these Dr. Greville has observed to elongate and become healthy branches.

Tribe VIII. Spongiocarpeæ.

Marine plants, of a dull dark reddish-purple colour, changing to nearly black on exposure to the air; of a cartilaginous substance and cellular structure. Root scutate. Frond filiform, cylindrical and dichotomous. Fructification uniform, consisting of naked spongy warts, composed of a mass of radiating filaments, among which are imbedded numerous roundish clusters of seeds, surrounded with a pellucid border; the seeds wedge-shaped, fixed by their base to a central point. Grev.

23. Polyídes. *Ag.* Polyides.

Frond cartilaginous, filiform, cylindrical. *Fructification;* naked, spongy warts, composed of radiating filaments, among

which are imbedded roundish clusters of wedge-shaped *seeds*, surrounded with a pellucid border, (and globular extremely minute *granules*, imbedded in swollen branches below the extremities of the fronds. *Griff.*) *Grev. Alg. Brit. p.* 69. *t.* 11.— Name πολυ, *many*, and ιδεα, *form* or *appearance;* but, as Dr. Greville justly remarks, scarcely applicable in the present instance, as the only well-known species is tolerably constant to all its characters.[1]

1. P. *rotúndus*, Grev. (*cylindrical Polyides*). *Grev. Alg. Brit. p.* 70. *t.* 11.— *P. lumbricalis, Ag. Sp. Alg. v.* 1. *p.* 192.— *Furcellaria rotunda, Lyngb.*— *Fucus rotundus, Gmel.*— *Turn. Syn. Fuc. p.* 309, *Hist. Fuc. t.* 5. *E. Bot. t.* 1738.— *Fucus radiatus, Gooden. et Woodw. in Linn. Trans. v.* 3. *p.* 202.— *Fucus fastigiatus, Linn. Herb.* (according to Turner).

On the south and eastern shores of England, not unfrequent. Rare in Scotland. Dumfries and Firth of Forth. Appin, *Capt. Carmichael.*— Root a flattened disk. Fronds 4 to 6 or 8 inches long, dark purplish-brown, the dichotomous branches fastigiate, with the angles of the dichotomies rather obtuse, their extremities forked, acute. Besides the more common spongy fructification of this genus, Mrs. Griffiths has communicated specimens from Sidmouth with "rather long, swollen branches, beneath the apices containing an immense quantity of globular, extremely minute seeds, of a pale purplish colour, amongst the fibres of which the substance is composed."— So closely is this plant allied in habit to the *Furcellaria fastigiata*, that it is much to be regretted they cannot be retained in the same Genus.

Tribe IX. Florideæ.

Plants all marine, of a purplish-red or fine rose-colour, seldom changing much by exposure to the air; of a coriaceous, carti-

[1] The curious spongy fructification was, indeed, misunderstood by Capt. Carmichael, and considered to be a distinct and parasitic *Alga*. I fear, from this circumstance, rather than from any other, my excellent friend, Dr. Greville (than whom no one was ever more ready to do justice to the merits of other Botanists) has been led to an erroneous estimate of that gentleman's character, when he says "Capt. Carmichael was remarkable rather as an *indefatigable collector* than as a *correct observer of plants.*"— As an *accurate* observer of nature, in general, this reserved but highly talented individual is *publicly* known by his "Account of the island of Tristan d'Acunha," given in the 13th vol. of the *Transactions of the Linnæan Society*, and by his "Journal" which lately appeared in the "Memoirs of his life," written by the Rev. Colin Smith, in the 1st and 2d vols. of the "*Botanical Miscellany.*" As an *acute* and *profound* observer in detail, he is perhaps at present only known to myself by a most extraordinary collection of the minutest of Nature's works, as displayed in the vegetable creation: and ample justice, it is hoped, will be done to his memory in the sheets of the present volume. So that, instead of expressing our surprise at his having fallen into errors while studying this most difficult tribe of plants, the only wonder is, that, in an obscure corner of the coast of Argyleshire, deprived of access to books, cut off from all society congenial to his feelings by high mountains on one side and the stormy billows of the Atlantic on the other, he should have committed so few errors, while recording so many and such novel discoveries.

laginous or membranaceous substance and cellular texture, often reticulated. Frond flat, compressed or cylindrical, with or without a midrib; sometimes furnished with distinct leaves or foliaceous expansions. Fructification often of two kinds; the first, sphærical or hæmisphærical capsules, sessile or stalked, and containing a round mass of seeds:—the second composed of granules (mostly ternate), scattered or collected into little spots (sori) or lines, and situated either in the general substance of the frond, or in little leaflets or distinct pod-like foliaceous processes. More than one kind of fructification is never found upon the same individual. Grev.

24. DELESSÉRIA. *Lamour.* Delesseria.

Frond rose-red, flat, membranaceous, with a percurrent midrib. *Fructification* of 2 kinds:—*capsules* containing a globular mass of *seeds*, and ternate *granules* forming definite sori in the frond or in distinct foliaceous leaflets. *Grev. Alg. Brit. p.* 71. *t.* 12.—Named in honour of *M. Benjamin Delessert*, a distinguished patron of Botany.

1. D. *sanguínea*, Lamour. (*oak-leaved Delesseria*); stem cylindrical branched bearing oblong or ovate sinuated quite entire waved transversely veined leaves, the midrib producing sphærical pedunculated capsules or scattered in oblong leafy processes. *Ag. Sp. Alg. v.* 1. *p.* 172. *Grev. Alg. Brit. p.* 72.—*Fucus sanguineus, Linn.—Turn. Syn. Fuc. p.* 7, *Hist. Fuc. t.* 36. *E. Bot. t.* 1041.—*β. latifolia;* leaves cordate lobed and plaited. *Carm. MSS.*

Sea-shores, frequent.—*β.* Appin, *Capt. Carmichael.* ♂. Fructification in Winter and Spring.—An elegant and delicate species, with leaves from 4 to 6 or 8 inches in length, of a fine rose colour, having deeper coloured veins. The fructification is generally found on the battered stalks and midrib. The *var. β.* is a singular and beautiful state of this plant, with leaves 4 inches in diameter, and hardly more in length, obtusely lobed and plaited. (*Carm.*)

2. D. *sinuósa*, Lamour. (*sinuous-leaved Delesseria*); stem cylindrical branched, frond at length pinnated with oblong dentato-sinuate or pinnatifid transversely veined crenated leaves ciliated at the margins with seed-bearing leaflets, sphærical capsules imbedded in the substance of the frond.—*Ag. Sp. Alg. v.* 1. *p.* 174.—*Fucus sinuosus, Gooden. et Woodw.—E. Bot. t.* 822. *Turn. Syn. Fuc. p.* 1, *Hist. Fuc. t.* 35.—*Fucus rubens. Huds.—Stackh.*

Parasitic on the stems of the larger Fuci. ♂. Fructification in Summer and Autumn.—Six to eight inches or more in length. Less delicate in texture, and of a much deeper colour than the preceding. Of this Capt. Carmichael found a *var.* at Appin, with the fronds 3½ inches in diameter.

3. D. *aláta*, Lamour. (*winged Delesseria*); frond linear subdichotomous and much divided in a somewhat pinnatifid manner, the segments linear, sphærical sessile capsules and naked seeds

both placed sometimes on the apices of the branches, and sometimes on oblong leaflets originating from the midrib.—*Ag. Sp. Alg. v.* 1. *p.* 178. *Grev. Alg. Brit. p.* 73.—*Fucus alatus, Huds.* —*Turn. Syn. Fuc. p.* 144. *t.* 160.—*β. angustissima;* frond extremely narrow without any trace of lateral membrane. *Turn. Hist. Fuc. t.* 160.

Upon rocks in the sea and larger Algæ, frequent.—*β.* Scarborough, *Mr. Pitchford;* and Lozie-mouth, Morayshire, *Mr. Brodie.* ♂. ?—4—6 inches long, of a deep rose-colour, with a strong midrib.

4. D. *Hypoglóssum*, Ag. (*proliferous Delesseria*); frond linear-lanceolate repeatedly proliferous from the midrib with leaves of the same shape and attenuated and acute, with very obscure pellucid simple oblique veins between the midrib and the margin, sphærical capsules on the midrib of the lesser leaves and oblong spots of seeds near their extremities.—*Ag. Sp. Alg. v.* 1. *p.* 176.—*Fucus Hypoglossum, Woodw.*—*Turn. Syn. Fuc. p.* 17, *Hist. Fuc. t.* 14. *E. Bot. t.* 1396.

On rocks in the sea and on the larger Algæ. ⊙. Fructification Summer.—2—4 inches to a span long, varying much in the width of the leaflets.

5. D. *ruscifólia*, Lamour. (*Ruscus-leaved Delesseria*); frond linear-oblong proliferous from the midrib with leaves of the same shape and very obtuse with pellucid branched bearded oblique veins between the midrib and the margin, sphærical capsules on the midrib of the lesser leaves and oblong spots of seeds near their extremities.—*Ag. Sp. Alg. v.* 1. *p.* 174. *Grev. Alg. Brit. p.* 76.—*Fucus ruscifolius, Turn. in Linn. Trans. v.* 6. *p.* 127. *t.* 8. *f.* 1, *Syn. Fuc. p.* 12, *Hist. Fuc. t.* 15. *E. Bot. t.* 1395.

Sea, on rocks and upon Algæ, scarce. Norfolk and Suffolk, Devonshire and Bognor. Bantry, *Miss Hutchins.* Miltown Malbay, Ireland, *Mr. Harvey.* ⊙. Summer.—Plant smaller, the leaves being much shorter than in the preceding species and very obtuse, but quite as broad. The different texture of the frond, arising from the peculiar, oblique, pellucid veins, will afford a further character by which the two may be distinguished.

25. Nitophýllum. *Grev.* Nitophyllum.

Frond plane, delicately membranaceous, rose-coloured, reticulated, wholly without veins, or with very slight vague ones towards the base. *Fructification;* hemisphærical *capsules* imbedded in the substance of the frond, and ternate *granules* forming distinct scattered spots.—Named from the Latin *nitor*, to *shine*, and the Greek φυλλον, a *leaf;* from the glossy surface of the fronds.—This Genus appears to be a natural one; but I find the species so difficult to distinguish in the dried state, that I have relied upon Dr. Greville for most of the characters. Beautiful specimens of nearly the whole of them I have received through the well-known liberality of Mrs. Griffiths.

1. N. *ocellátum*, Grev. (*ocellated Nitophyllum*); frond with a roundish outline extremely thin quite veinless cleft almost to the base, the segments repeatedly divided in a manner more or less between palmate and dichotomous mostly linear obtuse at the ends, spots of granules in the segments. *Grev. Crypt. Fl. t.* 347, *Alg. Brit. p.* 78. *Ag. Sp. Alg. v.* 1. *p.* 187.—*Fucus ocellatus* and *F. granateus*, *Lamour.*

Bantry Bay, *Miss Hutchins;* shores of Moray-shire, *Mr. Brodie* (*Grev.*). Torbay, Budleigh, Harbrech and Elberrey Cove, *Mrs. Griffiths.* ⊙. Summer.—4—5 inches in length, of a very delicate rose-pink.

2. N. *punctátum*, Grev. (*dotted Nitophyllum*); frond very thin quite destitute in every part of veins vaguely cleft for half its length or more into segments which become narrower as they subdivide, spots of granules scattered all over the frond. *Grev. Alg. Brit. p.* 79. *t.* 12. (*excl. the syn. of F. ulvoides, Turn.*) *Ag. Sp. Alg. v.* 1. *p.* 186.—*Fucus punctatus, With.*—*E. Bot. t.* 1575. *Turn. Hist. Fuc. t.* 71.—*Ulva punctata, Stackh.*

In the sea, attached to various Algæ. Weymouth, *Stackhouse.* Cornwall, *Dillwyn.* Caithness and Orkney, *Borrer*, *Clouston* and *Hook.* Isle of Bute, *Dr. Greville.* Appin, *Capt. Carmichael.* Belfast, *Dr. Drummond.* Miltown Malbay, Ireland, rare, *Mr. Harvey.* ⊙.—Summer.—This is surely very nearly allied to *N. ocellatum;* indeed I can hardly distinguish even fructified specimens, except by the more generally diffused spots of seeds in the present species.

3. N. *ulvoidéum*, (*Ulva-like Nitophyllum*); frond thickish but tender veinless roundish but very irregular in figure somewhat cuneate at the base variously cleft into oblong more or less broad segments rounded at the extremity, spots of granules small scattered over nearly the whole frond.—*Fucus ulvoides, Turn. Hist. Fuc. t.* 80. *E. Bot. t.* 2134.—*Nitophyllum Hilliæ, Grev. Alg. Brit. p.* 80.—*Delesseria ulvoides, Hook. Fl. Scot. P. II. p.* 101.—*D. Hilliæ, Grev. Crypt. Fl. t.* 351.

In the sea; coast of Moray, *Mr. Brodie.* Bantry, *Miss Hutchins.* Plymouth, *Miss Hill.* Torquay, *Mrs. Griffiths.* Whitsand Bay, *Mr. Arnott.* Miltown Malbay, *Mr. Harvey.* ⊙.—This is of a much thicker texture than the preceding, more irregular in its circumscription and of a deeper colour, verging on green when old. I have referred Dr. Greville's *N. Hilliæ* to the *Fucus ulvoides* of Mr. Turner, because Miss Hill's own specimens and those of Mrs. Griffiths exactly agree with a finer individual of Mr. Turner's plant in my Herbarium; and surely, too, with the figure above-quoted. The two ladies now mentioned, have had the good fortune to find both kinds of fructification, namely, scattered dots of seeds and hemisphærical capsules.

4. N. *Bonnemaisónii*, Grev. (*discoid Nitophyllum*); frond shortly stipitate extremely thin vaguely cleft the segments roundish wedge-shaped, the stem vanishing at the base of the frond in a few obscure veins, fructification scattered over the frond. *Grev. Alg. Brit. p.* 81.—*Delesseria Bonnemaisonii, Ag.*

Sp. Alg. v. 1. *p.* 186. *Grev. Crypt. Fl. t.* 322. (*excl. the figs.* 2 *and* 3.)

In the sea. Orkney, *Rev. C. Clouston.* Isle of Bute, *Dr. Greville.* Larne, near Belfast, *Dr. Drummond.* ⊙. Summer.—"Two to four inches in length, of a most beautiful rose-pink, which changes to purplish in drying. This species is clearly distinguished from the two subsequent ones by the spots of ternate granules being scattered over the disk of the frond. The figures 2 and 3 in the Cryptogamic Flora (*t.* 322.) belong to *N. Gmelini*, many specimens of which closely resemble the present in general outline." (*Grev.*)

5. N. *Gmelíni*, Grev. (*marginal-fruited Nitophyllum*); stem short passing into a frond with a roundish outline deeply cleft the main segments broadly wedge-shaped vaguely subdivided faintly marked with vague flexuose veins, the margin entire, spots of ternate granules irregular marginal. *Grev. Alg. Brit. p.* 82.—*Delesseria Gmelini, Lamour. Ess. p.* 36.—*Fucus laceratus, γ. Turn. Hist. Fuc. v.* 1. *p.* 153.

South coast of Devon, *Mrs. Griffiths.* Ilfracombe, *Miss Hill.* Larne, near Belfast, *Dr. Drummond.* ⊙. Summer.—A beautiful and very distinct plant, long known to Mrs. Griffiths, who finds it abundantly in Devonshire. It rarely exceeds 2 or 3 inches in length. In substance and marginal fructification this approaches the following species; in the general outline and comparative breadth of the frond it approaches the preceding ones. Dr. Greville observes that the Irish specimens, which I have not seen, are twice the size of English ones.

6. N. *lacerátum*, Grev. (*lacerated Nitophyllum*); frond membranaceous very tender plane veiny mostly dichotomous, segments sublinear thin apices rounded, the margins lacinulated waved and bearing the oblong spots of granules.—*Grev. Alg. Brit. p.* 83.—*Delesseria lacerata, Ag. Sp. Alg. v.* 1. *p.* 184.—*Fucus laceratus, Gmel.—Turn. Syn. Fuc. p.* 154, *Hist. Fuc. t.* 68. *E. Bot. t.* 1067.—*Fucus crispatus, Huds.—F. endivifolius, Lightf. Scot. p.* 948. *t.* 32.—*β. uncinata;* fronds narrow, lesser segments minute. *Turn.*

Common on the coasts of Great Britain.—*β.* Yarmouth, *Mr. Turner.* ⊙.—A very well marked, yet a variable plant in size and in the relative breadth of its frond and the more or less copious segments and lacinulæ. Dr. Greville well observes that "the whole frond has the power of attaching itself by the edges and creeping, as it were, upon the rocks and plants in its way; so much so, that it can hardly be gathered without some resistance and laceration."

26. Rhodoménia. *Grev.* Rhodomenia.

Frond plane, membranaceous, fine pink or red, quite veinless, sessile, or with a short stem which expands immediately into the frond. *Fructification:*—1. hemisphærical, scattered *capsules;* 2. minute, ternate *granules*, spreading over the whole or some part of the frond (not in defined spots). *Grev. Alg. Brit. p.* 84.

—Name; ῥοδος, *red*, and ὑμην, a *membrane*.—This seems to differ from some of the *Nitophylla*, solely in the ternate granules being scattered over the whole surface of the frond, not collected into definite spots.

1. R. *bífida*, Grev. (*bifid Rhodomenia*); frond thin membranaceous dichotomously divided broadly linear, the segments often subcuneate obtuse, capsules hemisphærical chiefly marginal.—*Grev. Alg. Brit. p.* 85.—*Delesseria bifida, Lamour.*—*Sphærococcus bifidus, Ag. Sp. Alg. v.* 1. *p.* 299.—*Halymenia bifida, Gmel.*—*Fucus bifidus, Good. et Woodw. in Linn. Trans. v.* 3. *t.* 17. *f.* 1. *E. Bot. t.* 773. *Turn. Syn. Fuc. p.* 163, *Hist. Fuc. t.* 154.—*β. ciliata;* frond somewhat cartilaginous purplish-brown opaque divided, the margins fringed with spathulate laciniæ. *Turn l. c.*

On rocks and the larger sea-weeds, not unfrequent on the coast of the south of England, especially of Devonshire and Cornwall. Norfolk and Suffolk. Tynemouth. Belfast and Bantry, Ireland. ☉. Summer.—The more usual state of this plant is of a beautiful deep rose-red, the margins free from laciniæ or nearly so; but the ciliated variety is so beset with linear, or, more frequently, spathulate laciniæ, and is so copiously divided, that it can hardly be recognised as the same species; its colour is much less bright, and its texture thicker and more opaque. From Mrs. Griffiths I possess numerous specimens. In some of these the capsules are by no means confined to the margin. The scattered granules are principally in the extremities of the frond, often, however, extending a good way down: frequently in the marginal laciniæ. The spreading fronds are from one to three inches in length.

2. R. *laciniáta*, Grev. (*laciniated Rhodomenia*); frond subcartilaginous palmatedly dichotomous, the segments broadly linear-oblong obtuse or erose often fringed with marginal laciniæ (linear or lanceolate) in which the sphærical capsules are situated, scattered granules marginal.—*Grev. Alg. Brit. p.* 86.—*Delesseria laciniata, Grev. Fl. Edin.*—*Hook. in Fl. Lond. N. Ser. cum Ic.*—*Fucus laciniatus, Huds.*—*Turn. Syn. Fuc. p.* 161, *Hist. Fuc. t.* 69. *E. Bot. t.* 1068.

More or less abundant upon all the coasts of Great Britain: very rare near Edinburgh, according to Dr. Greville. ♂. Fructification Spring and Summer.—4—6 or 8 inches long. The smaller and more delicate specimens have much resemblance to *R. bifida*.

3. R. *polycárpa*, Grev. (*many-fruited Rhodomenia*); frond between cartilaginous and membranaceous dichotomous or somewhat palmate, the segments sublinear laciniated and acute at the ends, capsules hemisphærical scattered over the frond. *Grev. Alg. Brit. p.* 87, *and Sphærococcus polyc., Grev. Crypt. Fl. t.* 352.

Cast on shore under Tait's Hill, near Plymouth, 1814; *Miss Hill.* Whitsand Bay, *Mr. Arnott.* ♂.?—Frond seven inches in length. Of this the capsular fructification only is known. "Its structure is dense and very similar under the microscope to that of *Rhodomenia Palmetta;* but the different colour (opaque, dull, pink-red, very dark at the base)

and the fructification, besides its greater thickness, at once remove it from that plant." *Grev.*—This species I am unacquainted with.[1]

4. R. *Palmétta*, Grev. (*small palmated Rhodomenia*); stipes short terete, frond subflabelliform more or less deeply divided in a somewhat palmated manner, the segments oblong or cuneate bifid the axils rounded the margins entire, capsules in the disk and margin, scattered granules forming a cloud at the extremity of the segments.—*Grev. Alg. Brit. p.* 88. *t.* 12.—*Sphærococcus Palm., Ag. Sp. Alg. v.* 1. *p.* 243.—*Delesseria Palm., Lamour.* —*Fucus Palm., Esp.*—*Turn. Syn. Fuc. p.* 21, *Hist. Fuc. t.* 73. *E. Bot. t.* 1120.—*Fucus bifidus, Huds.*

On rocks and the stems of the larger *Fuci*, especially on *Laminaria digitata*, chiefly in the south of England. Bantry, *Miss Hutchins.* Miltown Malbay, abundant, *Mr. Harvey.* ⊙. Summer and Autumn.—Of a fine deep rose colour; the texture somewhat cartilaginous, so that the specimens, in general, do not adhere to paper. Length from 2 to 4 or 5 inches; the taller and narrower specimens have much the appearance of *Sphærococcus membranifolius;* but, as Dr. Greville remarks, the latter has always a livid purplish hue, and the fructification is very different.

5. R. *cristáta*, Grev. (*crested Rhodomenia*); frond semicircular membranaceous subdichotomous, the segments somewhat dilated upwards repeatedly subdivided, the divisions alternate decurrent laciniate at the ends, capsules sphærical imbedded in the margin of the frond. *Grev. Alg. Brit. p.* 89.—*Sphærococcus cristatus, Ag. Sp. Alg. v.* 1. *p.* 300. *Lyngb. Hydroph. Dan. t.* 4. *Grev. Crypt. Fl. t.* 5.—*Fucus cristatus, Linn. Herb.*—*Turn. Hist. Fuc. t.* 23. (excl. the *var.* γ.)—β. frond narrow linear throughout. *Turn. l. c.*

In the sea, upon the stems of *Laminaria digitata.* Firth of Forth, *Dr. Greville.*—β. On the shore at Wick, Caithness, *Borrer and Hook.* Berwick, *Dr. Johnston.* ⊙. July.—This is certainly a rare species, and I am not aware of any other stations than those just mentioned. The *var.* β. (*Turn.*) is perhaps the same as *Fucus Bangii* of Flora Danica, t. 1477. The *var.* γ. of Mr. Turner is a species of *Rytiphlæa, Ag.* (*R. complanata*, Ag.) and not a native of Britain, that I am aware of, though stated, by *Agardh*, to be found in Ireland.

6. R. *ciliáta*, Grev. (*ciliated Rhodomenia*); frond subcartilaginous more or less lanceolate dichotomous and pinnatifid with

[1] Since the above was written, I have seen a specimen from Mr. Arnott, in the possession of Mr. Harvey; and I do indeed fully agree with the former, who says, in a letter to me (and contrary to the opinion of Dr. Greville), "I still think this is the *Fucus Sarniensis* of Mertens and Roth; for in the Catalecta Botanica are figured distinct *capsules* very different from the fructification of the Genus *Halymenia.*"—These capsules are indeed very obscure and imperfect, as compared with those on Mr. Arnott's specimen, but I have no hesitation in considering the two to be specifically identical; and these are both, in my opinion, much more nearly allied to *Rhodom. sobolifera* than to *palmata.* At any rate, I am quite of opinion, that if *R. Sarniensis* be united with *R. palmata*, so must *R. sobolifera* and *R. polycarpa.* The real capsules have only been found on this latter.

lanceolate copiously ciliated laciniæ, cilia simple patent subulate bearing the capsules at the extremity, root fibrous creeping. — *Grev. Alg. Brit. p.* 90. — *Sphærococcus ciliatus, Ag. Sp. Alg. v.* 1. *p.* 263. *Lyngb. Hydroph. Dan. t.* 4. — *Delesseria ciliata, Lamour.* — *Fucus ciliatus, Huds.* — *Turn. Syn. Fuc. p.* 169, *Hist. Fuc. t.* 70. *figs. a—e. E. Bot. t.* 1069.

Frequent on the coasts of England, especially in the south. ⊙. *Fructification* in the winter.—This and the following species Dr. Greville observes to differ from the rest of the Genus in the distinctly fibrous root; *R. Palmetta* alone having its disk furnished with fibres which often creep.

7. R. *jubáta*, Grev. (*shaggy Rhodomenia*); root fibrous, frond flaccid between membranaceous and coriaceous linear attenuated vaguely branched, the branches simple or once or twice pinnatifid ciliated, the cilia linear-subulate containing the fructification. *Grev. Alg. Brit. p.* 91.—*Sphærococcus jubatus, Grev. Crypt. Fl. t.* 359.—*S. ciliatus, vars. jubatus, linearis, angustus and spinosus, Ag. Sp. Alg. v.* 1. *p.* 264 (*according to Grev.*).—*Fucus jubatus, Good. and Woodw. in Linn. Trans. v.* 3. *t.* 17. *Stackh. Ner. Brit. t.* 11.—*Fucus ciliatus, vars. jubatus, lanceolatus, angustus and spinosus, Turn. Hist. Fuc. t.* 70. *figs. f.—h.* (*Greville.*)

In the sea; attached to rocks and the larger Algæ, abundant in Devon and Cornwall, *Mrs. Griffiths.* Plymouth, *Miss Hill, Mr. Sconce.* Miltown Malbay, *Mr. Harvey.* ⊙. *Fructification*, Summer. — A most variable plant, especially in the length of its laciniæ, which are sometimes 5 or 6 inches in length and cirrhose, as in specimens found by Mrs. Griffiths and Mr. Harvey. Mrs. Griffiths has the merit, Dr. Greville observes, of clearly ascertaining the distinctness of this species, by pointing out the "flaccid substance, so different from the preceding, and the important fact, that the one is a summer and the other a winter plant." The granules, too, in *R. ciliata*, invariably occupy the surface of the frond itself; while in *R. jubata* they are placed in the cilia. Still the opinion of many eminent Botanists is at variance with this, as may be seen by the above synonyms: and in regard to substance, I find it to be by no means constant. Mr. Arnott, who has gathered this plant in Devonshire, bearing fruit on the 6th of May, does not consider it distinct from *R. ciliata.*

8. R. *palmáta*, Grev. (*larger palmated Rhodomenia or Dulse*); frond submembranaceous palmated quite entire at the margin the segments oblong mostly simple, granules collected into widely irregularly shaped spots or clouds scattered over the whole frond. — *Grev. Alg. Brit. p.* 93. — *Halymenia palmata, Ag. Sp. Alg. v.* 1. *p.* 204. — *Delesseria palmata, Lamour.* — *Fucus palmatus, Linn.* — *Lightf. Scot. v.* 2. *t.* 27. *Turn. Syn. Hist. Fuc. t.* 115. *E. Bot. t.* 1306. — *Ulva palmata, Lyngb.* —β. *Sarniensis*; frond thinner laciniated the segments very narrow. — *Grev. l. c.* — *Fucus Sarniensis, Mert. in Roth. Cat. Bot. v.* 3. *p.* 103. *p.* 1. *Turn. Hist. Fuc. t.* 44.

Abundant on all the rocky shores of Great Britain.—β. Jersey.—⊙. or ♂. Winter. — Four to six inches or a foot high, of a livid purplish

colour. This is the *Dulse* of the Scotch, who are very fond of it in a fresh and crude state. Lightfoot says, however, that they prefer it dried and rolled up, when they chew it like tobacco for the pleasure arising from the habit. This is the "*saccharine Fucus*," or *Sol* of the Icelanders, the efflorescence of which has a sweetish and not disagreeable taste. It is dried by the natives, packed down in casks, and used as occasion requires, frequently cooked with butter. Cattle, sheep in particular, often eat this species with eagerness, whence it has been called *Fucus ovinus*. I follow the able author of the Algæ Brit., in uniting the *Fucus Sarniensis* of Mertens with the *Rhodomenia palmata*, and indeed I have received specimens from Mrs. Griffiths which are clearly intermediate. The capsular fruit has been detected (by Professor Mertens) only on the *var.* β. See note to *R. polycarpa*, *p.* 290.

9. R. *sobolífera*, Grev. (*proliferous Rhodomenia*); frond membranaceous shortly stipitate, stem filiform dividing into branches which expand into flat dilated fronds much deeply and irregularly cleft, the segments linear wedge-shaped laciniated at their apex. *Grev. Alg. Brit. p.* 95.—*Halymenia? sobolifera, Ag. Sp. Alg. v.* 1. *p.* 218.—*Fucus soboliferus, Fl. Dan.*—*Turn. Hist. Fuc. t.* 45. *E. Bot. t.* 2133. *Hook. Fl. Scot. P. II. p.* 107.

On *Laminaria digitata*, shores of the Orkney islands. Mull of Galway, *Rev. Dr. Walker*. Glenarm, Ireland, *Dr. Drummond*.—The nearest ally of this is undoubtedly the *var.* β. *Sarniensis* of *Rhodomenia palmata:* but it is much smaller, and the frond is marked with obscure but larger reticulations. Fructification unknown.

10. R. *renifórmis*, (*kidney-shaped Rhodomenia*); stipes very short, frond simple or branched suddenly expanding into a cartilagineo-membranaceous simple or proliferous entire lobed or laciniated reniform or suborbicular frond, capsules and granules scattered.—*Irudæa reniformis, Bory.*—*Halymenia renif., Ag. Sp. Alg. v.* 1. *p.* 201.—*Fucus reniformis, Grev. Alg. Brit. v.* 160. *Turn. Hist. Fuc. t.* 113. *E. Bot. t.* 2116.

Sea-shore, Isle of Wight, *Miss Everett*. Rocks, Budleigh and Torquay, *Mrs. Griffiths*. Ilfracombe, *Miss Hill*. Cornwall, *Mr. Rashleigh*. Miltown Malbay, *Mr. Harvey*. ♃? Summer and Autumn.—Frond sometimes 7—8 inches in length. The β. of Mr. Turner scarcely deserves to be mentioned as a *var.*, for it may be seen gradually passing into the more usual state of the species.—I have, at the suggestion of Mr. Harvey, and with the consent of Dr. Greville, referred this plant to *Rhodomenia*. It possesses the ternate granules; while the "immersed globules" of the latter author are truly a capsular fruit, figured and described by Mr. Turner. Mrs. Griffiths finds both kinds of fructification at Torquay.

(*Rhodomenia Teedii* of Dr. Greville will here be found under the Genus *Gigartina.*)

27. Plocámium. *Lamour.* Plocamium.

Frond filiform, compressed, between membranaceous and cartilaginous, fine pink-red, much branched, branches distichous (alternately secund and pectinate). *Fructification* of 2 kinds:

—sphærical sessile *capsules*, and lateral minute processes containing oblong *granules*, transversely divided into several parts by pellucid lines. *Grev.*—Named from πλοκαμος, *intertwined hair*, from the fine, much branched fronds.

1. P. *coccíneum*, Lyngb. (*scarlet Plocamium*). *Lyngb. Hydroph. Dan. t.* 9. *Grev. Alg. Brit. p.* 98. *t.* 12.—*Plocamium vulgare, Lamour.*—*Delesseria Plocamium, Ag. Sp. Pl. v.* 1. *p.* 180.—*Fucus Plocamium, Gmel.*—*Lightf.*—*Fucus coccineus, Huds.*—*Turn. Syn. Fuc. p.* 291, *Hist. Fuc. t.* 59. *E. Bot. t.* 1242.

Sea-coasts, abundant, every where. ♃. ? Summer and Autumn.

28. Microcládia. *Grev.* Microcladia.

Frond filiform, compressed, subcartilaginous, irregularly branched, the branches distichous. *Fructification* of 2 kinds: sessile sphærical *capsules*, accompanied by an *involucre* in the form of several short ramuli: and ternate *granules* in the swollen apices of the branches. *Grev. Alg. Brit. p.* 29. *t.* 13.—Name, μικρος, *small*, and κλαδος, *a branch*, from the very delicate ramification.

1. M. *glandulósa*, (*glandular Microcladia*). *Grev. Alg. Brit. p.* 99. *t.* 13.—*Delesseria glandul., Ag. Sp. Alg. v.* 1. *p.* 192.—*Fucus glandulosus, Banks. Herb.*—*Turn. Hist. Fuc. t.* 38. *E. Bot. t.* 2135.

On the larger marine Algæ, Budleigh and Torquay, *Mrs. Griffiths.* ⊙. *Fructification.* September and October.—A small (2 or 3 inches high), but very distinct and well-marked plant.

29. Odonthália. *Lyngb.* Odonthalia.

Frond plane, between membranaceous and cartilaginous, dark vinous-red, with an imperfect or obsolete midrib, alternately toothed at the margin. *Fructification* marginal or axillary or in the teeth:—1. *Capsules*, containing pear-shaped *seeds*, fixed by their base:—2 slender processes, containing ternate *granules*. *Grev. Alg. Brit. p.* 100. *t.* 13.—Name; οδους, οντος, a *tooth*, and θαλασση, the *sea*; in allusion to the toothed margin of this marine plant.

1. O. *dentáta*, Lyngb. (*toothed Odonthalia*); frond branched, the branches pinnatifid, laciniæ linear-oblong alternate sharply toothed at the extremity, peduncles aggregate bearing clustered capsules.—*Lyngb. Hydroph. Dan. t.* 3. *Grev. Alg. Brit. p.* 101. *t.* 13.—*Rhodomela dentata, Ag. Sp. Pl. v.* 1. *p.* 370.—*Delesseria dentata, Lamour.*—*Fucus dentatus, Linn.*—*Turn. Syn. Fuc. p.* 149, *Hist. Fuc. t.* 13. *E. Bot. t.* 1241.

On the northern coasts only of Great Britain, both on the Atlantic side and in the German ocean. Frequently on old stems of *Laminariæ*.

♃. *Fructification* January and March.—In English Botany, and in Mr. Turner's Hist. Fuc., the capsules are represented and described as urceolate. Dr. Greville finds them to be broadly ovate.

30. Rhodómela. *Ag.* Rhodomela.

Frond cylindrical or compressed, filiform, much branched, coriaceo-cartilaginous (the apex sometimes involute). *Fructification;*—subglobose *capsules,* containing free, pear-shaped *seeds;* and pod-like receptacles, with imbedded ternate *granules. Grev. Alg. Brit. p.* 102. *t.* 13.—Name; ῥοδος, *red,* and μελας, *black;* in allusion to the change of colour from a purplish-red when recent, to black, when dry.

* *Summit of the branches straight (not involute).*

1. R. *Lycopodioídes,* Ag. (*Club-moss Rhodomela*); frond terete mostly simple every where covered with closely imbricated filiform patent ramuli generally forked at their apices and intermixed with the setaceous remains of former branches.—*Ag. Sp. Alg. v.* 1. *p.* 377. *Grev. Alg. Brit. p.* 102.—*Gigartina Lycopod., Lyngb.*—*Fucus Lycopod., Linn.*—*Turn. Syn. Fuc. p.* 343, *Hist. Fuc. t.* 12. *E. Bot. t.* 1163.

On the stems of *Laminaria digitata,* Sussex and Devon, but chiefly on the northern shores of Great Britain. ♃.—May—July.—4—8 inches long.

2. R. *subfúsca,* Ag. (*brownish Rhodomela*); frond filiform much and irregularly branched, branches subulate pinnate and subalternate often clustered. *Ag. Sp. Alg. v.* 1. *p.* 378. *Grev. Alg. Brit. p.* 103.—*Gigartina subfusca, Lamour.*—*Lyngb.*—*Fucus subfuscus, Woodw. in Linn. Trans. v.* 1. *p.* 131. *t.* 12. *Turn. Syn. Fuc. p.* 350, *Hist. Fuc. t.* 10. *E. Bot. t.* 1164.

Coasts of Great Britain; on rocks and the larger Algæ. ♂. *Fructification* February and in Summer.—An extremely variable plant at different seasons of the year; being much injured in winter and destitute of the branchlets.

** *Summit of the branches involute.*

3. R. *pinastroídes,* Ag. (*Pinaster-like Rhodomela*); frond terete branched, the branches clothed with numerous secund spuriously jointed ramuli, recurved at the apex.—*Ag. Sp. Alg. v.* 1. *p.* 381. *Grev. Alg. Brit. p.* 104. *t.* 13.—*Gigartina Pinaster, Lyngb.*—*Fucus pinastroides, Gmel.*—*Turn. Syn. Fuc. p.* 346, *Hist. Fuc. t.* 11. *E. Bot. t.* 1042.

On rocks in the southern coasts of England, frequent. Near Dublin, *Dr. Scott.* ♃.—Winter.—6—8 inches high.

4. R. *scorpioídes,* Ag. (*scorpion's tail Rhodomela*); frond erect capillary much divided with horizontal branches, the uppermost singularly involute at the extremity.—*Ag. Sp. Alg. v.* 1. *p.* 380. *Grev. Alg. Brit. p.* 105.—*Fucus scorpioides,*

Huds. Angl. ed. 1.—*Fucus amphibius, Huds. Angl. ed.* 2.—*Turn. Fuc. p.* 391, *Hist. Fuc. t.*109. *E. Bot. t.* 1428.—*Plocamium amphibium, Lamour.*

Southern and eastern sea-coasts of England, chiefly in salt marshes among *Atriplex* and other saline phænogamous plants. N. Wales, *Rev. Hugh Davies.* ⊙.? Summer.—1—3 inches high; a dubious plant as to genus. Roth describes minute, axillary, roundish capsules, and lanceolate, pod-like receptacles of granules as not uncommon. Mr. Turner hinted at its affinity with *Polysiphonia fastigiata;* and though there are no real articulations, Dr. Greville considers it as a connecting link between that plant and the *Algæ Inarticulatæ.* Its place of growth is remarkable. I have gathered it abundantly at Cromer in Norfolk, growing in tufts like *Cladonia rangiferina,* which it much resembles in ramification.

31. Bonnemaisónia. *Ag.* Bonnemaisonia.

Frond membranaceous, compressed or plane, filiform, much branched, the branches pectinated with distichous cilia. *Fructification,* sessile or pedicellate *capsules,* containing a cluster of pyriform (compound?) *seeds,* fixed by their base. *Grev. Alg. Brit. p.* 106. *t.* 13.—Named in honour of *M. Bonnemaison,* a French Algologist.

1. B. *asparagoídes,* Ag. (*Asparagus-like Bonnemaisonia*); frond compressed very much branched delicate ciliated with distichous subulate ramuli, capsules alternating with these ramuli and pedunculated. *Ag. Sp. Alg. v.* 1. *p.* 197.—*Plocamium asparag., Lamour.*—*Fucus asparag., Woodw. in Linn. Trans. v.* 2. *t.* 6. *E. Bot. t.* 571. *Turn. Syn. Fuc. p.* 364, *Hist. Fuc. t.* 101.

On rocks and stones in the sea, rare; Cornwall, Norfolk and Suffolk. Bantry Bay and near Belfast. Abundant at Quilty, Miltown Malbay, *Joshua Fennell, Esq.*—⊙. Summer.—A delicate and very beautiful plant, of a cellular texture. Mr. Harvey finds on this species a modification of the capsule, which appears analogous to what Dr. Greville describes on *Laurencia pinnatifida* as "*disciform receptacles.*"

32. Lauréncia. *Lamour.* Laurencia.

Frond cylindrical, filiform, between gelatinous and cartilaginous, mostly yellowish or purplish-red. *Fructification* of two kinds:—1. Ovate *capsules* with a terminal pore, containing a cluster of stalked pear-shaped *seeds* fixed by their base:—2. Ternate *granules* imbedded in the ramuli. *Grev. Alg. Brit. p.* 108. *t.* 14.—Named in compliment to a French Naturalist, *M. de la Laurencie.*—"All the species," Dr. Greville observes, "have their branches either obtuse and often lobed, or set with little incrassated ramuli; and it is in these parts that the ternate granules are always imbedded."

* *Ramuli turgid, obtuse.*

1. L. *pinnatífida,* Lamour. (*pinnatifid Laurencia*); frond

compressed subcartilaginous bi-tripinnatifid the branches alternate, ultimate ones obtuse simple or lobed. *Grev. Alg. Brit. p.* 108. *t.* 14.—*Chondria pinnatifida, Ag. Sp. Alg. p.* 1. *p.* 337.—*Gelidium pinnatif., Lyngb.*—*Fucus pinnatif., Huds.*—*Turn. Syn. Fuc. p.* 267, *Hist. Fuc. t.* 20. *E. Bot. t.* 1202.—β. *Osmunda;* frond flat generally undivided, ramuli short and multifid. *Turn. l. c.*—*Fucus Osmunda, Gmel. Stackh.*—γ. *angusta;* frond roundish, ramuli cylindrical thickened upwards set on all sides of the stem often clustered and simple. *Turn. l. c.*—δ. *tenuissima;* frond flat, ramuli very thin and much branched, the branches divaricated. *Turn. l. c.*

α. β. γ. Rocks in the sea, every where.—δ. Devon and Cornwall, *Mr. Stackhouse, Mrs. Griffiths.* ⊙. Summer.—Besides the common modes of fructification on this very variable plant, Mrs. Griffiths finds capsular receptacles, and Miss Cutler, saucer-shaped receptacles, filled with "numerous linear, simple, or divided bodies, vertically arranged, apparently composed of very short filaments surrounding a longitudinal axis, the whole terminated by a number of round pellucid lobes." The species is from one to many inches in length.

2. L. *obtúsa*, Lamour. (*blunt-pointed Laurencia*); frond cylindrical filiform repeatedly pinnated, branches generally opposite, ramuli cylindrical short patent truncated. *Lamour. Essai p.* 42. (*and L. intricata, L. cyanospermia, together with L. gelatinosa and lutea of the same author, according to Ag.*) *Grev. Alg. Brit. p.* 111.—*Chondria obtusa, Ag. Sp. Alg. v.* 1. *p.* 340.—*Fucus obtusus, Huds.*—*Turn. Syn. Fuc. p.* 43, *Hist. Fuc. t.* 21. *E. Bot. t.* 1201.

Parasitic on the larger *Algæ* on most of our coasts, but chiefly in the south. ⊙. Summer.—3—6 inches long. Colour a pale very fugitive pink.

** *Ramuli much attenuated at the base.*

3. L. *dasyphýlla*, Grev. (*thick-leaved Laurencia*); frond filiform cylindrical branched in an irregularly pinnated manner, branches patent mostly simple, ramuli cylindrical scattered proliferous, attenuated at the base. *Grev. Alg. Brit. p.* 112.—*L. cæspitosa et Gigartina dasyphylla, Lamour.*—*Chondria dasyph., Ag. Sp. Alg. v.* 1. *p.* 350.—*Fucus dasyph., Woodw. in Linn. Trans. v.* 2. *p.* 239. *t.* 21. *Turn. Syn. Fuc. p.* 38, *Hist. Fuc. t.* 22. *E. Bot. t.* 847.

Rocks and stones, on the sea-shore in various parts of Great Britain. ⊙. Summer.—Frond 3—6 inches in length, pale pinky-brown, generally marked with transverse striæ.

4. L. *tenuíssima*, Grev. (*slender Laurencia*); frond filiform much branched in a pinnated manner, ultimate branchlets short setaceous much attenuated at the base.—*Grev. Alg. Brit. p.* 113.—*Gigartina tenuiss., Lamour.*—*Chondria tenuiss., Ag. Sp. Alg. v.* 1. *p.* 353.—*Fucus tenuiss., Good. et Woodw., in Linn. Trans. v.* 3. *p.* 215. *t.* 19. *Turn. Syn. Fuc. p.* 35, *Hist. Fuc. t.* 100. *E. Bot. t.* 1882.

On rocks and on the larger *Algæ* on the coast of Dorset (*Goodenough and Woodward*). Isle of Wight, *Rev. G. R. Leathes*. Devon (*Mrs. Griffiths*), and Cornwall (*E. Bot.*). ⊙. Summer.—6—8 inches high. Readily distinguished by its very slender uniform ultimate ramuli or pinnules.—I possess most beautiful specimens from Mrs. Griffiths, gathered at Elberrey Cove, in fructification.

33. CHYLOCLÁDIA. *Grev. MSS.* Chylocladia.

Frond cylindrical, filiform (often constricted as if jointed), between gelatinous and cartilaginous, of a pinky-red colour. *Fructification* of two kinds:—1. sphærical, ovate or conical *capsules*, with wedge-shaped or angular *seeds*:—2. imbedded, ternate *granules*. *Grev. Alg. Brit.* (under *Gastridium*) *p.* 114. *t.* 14.—Name χυλος, *juice*, and κλαδος, a *branch*, from the succulent nature of the ramuli.—The name *Gastridium* having been previously given to a Genus of Grasses, it has been necessary to change it.

* *Frond without constrictions.*

1. C. *clavellósa*, (*clavellated Chylocladia*); frond subgelatinous filiform cylindrical much and irregularly branched, branches and ramuli mostly alternate and distichous, ultimate ones more or less lanceolate attenuated at the base.—*Gastridium clavellosum, Lyngb.—Grev. Alg. Brit. p.* 115.—*Chondria clavel., Ag. Sp. Alg. v.* 1. *p.* 353.—*Gigartina clavel., Lamour.—Fucus clavellosus, Turn. in Linn. Trans. v.* 6. *p.* 123. *t.* 9. *Hist. Fuc. t.* 30. *E. Bot. t.* 1283.—β. *sedifolia*; ramuli between oblong and ovate crowded undivided. *Turn. l. c.*—*Gastridium purpurascens, Lyngb. Hydroph. Dan. t.* 17.

On various parts of the coast of England, Scotland, and Ireland. ⊙. Summer.—Three inches to almost a foot in length. Mr. Harvey finds an appearance of joints in the ultimate ramuli, very evident when fresh.

** *Ramuli elliptical, rarely somewhat elongated and constricted.*

2. C. *ovális*, (*oval-leaved Chylocladia*); frond subgelatinous nearly cylindrical filiform dichotomous naked below above bearing elliptical simple ramuli tapering at their base, capsules sphærical with a pellucid border.—*Gastridium ovale, Grev. Alg. Brit. p.* 116. *t.* 14.—*Chondria ovalis, Ag. Sp. Alg. v.* 1. *p.* 348.—*Gigartina vermicularis et ovata, Lamour.—Fucus ovalis, Huds.—E. Bot. t.* 711. *Turn. Syn. Fuc. p.* 30, *Hist. Fuc. t.* 81.—*F. sedoides, Good. et Woodw. in Linn. Trans. v. c.* 117.

In the sea, on rocks, or parasitic on the larger Algæ, on almost all our coasts. ⊙. Summer.—The ramuli are usually simple; but, as Dr. Greville remarks, sometimes elongated to half an inch or more, constricted 3 or 4 times, with a few minute branchlets at the constrictions, as in the following species; from which it is in other respects considerably different.

*** *Frond constricted as if jointed.*

3. C. *kalifórmis*, (*Salsola-like Chylocladia*); frond subgela-

tinous tubular constricted as if jointed much and irregularly branched, branches generally bearing whorls at the constrictions, capsules sphærical with a pellucid border.— *Gastridium kaliforme, Lyngb.— Grev. Alg. Brit. p.* 117.— *Chondria kaliformis, Ag. Sp. Alg. v.* 1. *p.* 355.— *Gigartina kaliformis, Lamour.— Fucus kaliformis, Good. et Woodw. in Linn. Trans. v.* 3. *p.* 206. *t.* 18. *E. Bot. t.* 640. *Turn. Syn. Fuc. p.* 377, *Hist. Fuc. t.* 29.

In similar situations and on the same coasts with the preceding. ⊙. Summer.

4. C. *párvula, (least Chylocladia)*; frond with scattered entangled branches, the constrictions nearly equal in length and breadth, capsules ovate containing a sphærical mass of wedge-shaped seeds.— *Gastridium parvulum, Grev. Alg. Brit. p.* 119. — *Chondria parvula, Ag. Sp. Alg. p.* 207. *Grev. Crypt. Fl. v.* 6. *t.* 346.— *Fucus kaliformis, γ. nanus, Turn. Hist. Fuc. v.* 1. *p.* 67.

Parasitic on the larger Algæ. Coast of Devon, *Mrs. Griffiths.* Brighton, *Mr. Borrer.* ⊙. Summer.—2—3 inches long. Distinguished, according to Dr. Greville, from *C. kaliformis*, of which it will be seen that Mr. Turner makes it a *variety*, by the ovate capsules, destitute of a pellucid border. Mrs. Griffiths observes that its fructification is produced a month later.

5. C. *articuláta, (articulated Chylocladia)*; frond tubular constricted throughout as if jointed much branched dichotomous and whorled subfastigiate, articulations subcylindrical, capsules urceolate.— *Gastridium articulatum, Grev. Alg. Brit. p.* 120.— *Chondria artic., Ag. Sp. Alg. v.* 1. *p.* 357.— *Lomentaria artic., Lyngb.— Gigartina artic., Lamour.— Fucus artic., Lightf.— Turn. Syn. Fuc. p.* 383, *Hist. Fuc. t.* 106. *E. Bot. t.* 1574.

On rocks and the larger *Algæ*, on most of the British shores. ⊙. Summer.—Three and four inches to a foot in length, in some of Miss Hutchins' specimens from Bantry; and varying much in the thickness of the frond; the whole jointed in a catenulated manner. "There is not much," observes Captain Carmichael, "in the definition to distinguish this species from *C. kaliformis*, though, to look at them beside each other we should pronounce them at once to be distinct. Lyngbye has fallen upon an ingenious contrivance to avoid the confusion that might take place from too near an approximation of them. He has erected the latter into a separate Genus; nor only that, he has transferred it into a different section under the idea of the frond being solid, which assuredly it is not, at least in this part of the world." *Carm.*

34. GIGARTÍNA. *Lamour.* Gigartina (Gigartina *and* Gracilaria. *Grev.*).

Frond more or less cartilaginous, filiform, cylindrical or compressed, irregularly branched, of a dull red colour. *Fructification;—capsules* containing a mass of minute roundish *seeds;* and (in many of the species, perhaps in all) roundish or oblong,

simple *granules*, imbedded in the fronds of distinct plants. *Grev. Alg. Brit. p.* 121. *t.* 14. *and p.* 146. *t.* 16.—Name; from γιγαρτον, a *grape-stone*, which the seeds somewhat resemble as seen through the capsule.—At the suggestion of Mrs. Griffiths and Mr. Harvey, and with the approbation of Dr. Greville, I gladly unite *Gracilaria* of the latter with *Gigartina*. The former of these Botanists having discovered the second or granular mode of fructification upon *Gigartina acicularis*, it may be presumed to exist, though as yet unnoticed, in other *Gigartinæ;* and in *G. Griffithsiæ* and G. *plicata* no regular fructification has been detected.

1. G. *purpuráscens*, Lamour. (*purplish Gigartina*); frond cylindrical filiform much and irregularly branched, ramuli setaceous scattered bearing sphærical tubercles immersed in their substance.—*Gracilaria purpur., Grev. Alg. Brit. p.* 122.—*Sphærococcus purpur., Ag. Sp. Alg. v.* 1. *p.* 318.—*Fucus purpur., Huds.*—*Turn. Syn. Fuc. p.* 357, *Hist. Fuc. t.* 9. *E. Bot. t.* 1243.—*F. tuberculatus, Lightf.*

On submarine rocks and Algæ, frequent. ⊙. Summer.—Varying in size, from 6—8 inches to more than a foot, and also in the branches which sometimes terminate in a kind of tendrils, twisting round other Algæ. The frond is somewhat gelatinous so as generally to adhere to paper when dry, the colour is somewhat pellucid purplish-red, often greenish in decay: but the best character is to be found in the immersed capsules, causing a swollen appearance all round the ramuli which produce them.

2. G. *confervoídes*, Lamour. (*Conferva-like Gigartina*); frond cartilaginous cylindrical filiform irregularly branched, branches elongated bearing numerous slender ramuli attenuated at each end, capsules external roundish scattered.—*Gracilaria conferv., Grev. Alg. Brit. p.* 123.—*Sphærococcus conferv., Ag. Sp. Alg. v.* 1. *p.* 303.—*Fucus confervoides, Linn.*—*Turn. Syn. Fuc. p.* 328, *Hist. Fuc. t.* 84.—*E. Bot. t.* 1668.—*F. verrucosus, Huds.*—β. *procerrima;* branches very long generally simple and almost naked. *Turn.*—*F. longissimus, Stackh.*—γ. *albida;* frond compressed mostly dichotomous, ramuli subulate. *Turn.*—*F. albidus, Huds.*—δ. *geniculata;* frond distorted and bent as if broken at the tubercles. *Turn.*

Rocky sea-shores, not unfrequent, especially in the south. Rare in Scotland. Firth of Tay, *Rev. J. Macvicar.* Appin, *Captain Carmichael*, and at Miltown Malbay, Ireland, *Mr. Harvey.*—More cartilaginous than the preceding, and generally more slender, and abundantly distinguished by the different mode of fructification.

3. G. *compréssa*, (*compressed Gigartina*); frond cartilaginous brittle between cylindrical and compressed dichotomous, branches subdistichous spreading lax gradually attenuated to a subulate point, capsules hemisphærical. *Gracilaria compressa, Grev. Alg. Brit. p.* 125.—*Sphærococcus compressus, Ag. Sp.*

Alg. v. 1. *p.* 308.—*S. lichenoides, Grev. Crypt. Fl. v.* 6. *t.* 341. (*not Linn. and Turn.*)

Sea-shore at Sidmouth, *Mrs. Griffiths* and *Miss Cutler*. ⊙. August. —No one has had the good fortune to meet with this Alga except Mrs. Griffiths and Miss Cutler, to whom I am indebted for most beautiful specimens. To me, its nearest affinity (exclusive of the fructification) appears to be with *G. purpurascens*. It is nearly of the same colour and texture, but stouter and shrinking very remarkably in drying. In colour and substance it is strikingly different from the *Fucus lichenoides* of *Linn.* and the *Hist. Fuc.*, to which, on account of the similarity of the ramification, both Mrs. Griffiths and Dr. Greville were disposed to refer it. The specimens bear both the kinds of fructification of the Genus.

4. G. *erécta*, (*small upright Gigartina*); frond cylindrical dichotomous erect, branches sub-simple, capsules globose, granules in terminal pod-like ramuli. *Gracilaria erecta, Grev. Alg. Brit. p.* 124. *t.* 14.—*Sphærococcus? erectus, Grev. Crypt. Fl. t.* 357.

Flat rocks and half-immersed in sand, on the coast of Devon as at Torbay and Sidmouth, *Mrs. Griffiths*. ♃. February, March.—Another of the many interesting discoveries of Mrs. Griffiths, who has long distinguished it by the appropriate name of "*suffocata*," growing, as it does in a tufted manner, and more than half buried in the sand. It is slender, erect, rigid, 2—4 inches high, and bears, besides the true capsules, lanceolate, pod-like receptacles, containing oblong scattered granules imbedded in the circumference.

5. G. *pistilláta*, Lamour. (*pestle-bearing Gigartina*); frond horny linear compressed vaguely dichotomous and beset with numerous subulate distichous horizontal ramuli which bear the capsules at or near their extremities.—*Grev. Alg. Brit. p.* 146. —*Fucus pistillatus, Gmel.*—*F. Gigartinus, Linn.*—*Turn. Syn. Fuc. p.* 280, *Hist. Fuc. t.* 28. *E. Bot. t.* 908.

Rocks on the coast of Cornwall, *Dr. Wenman*. Mount's Bay, *Dr. Macculloch*. Padstow, *Miss Hill*. I have specimens from the same coast, gathered by *Mr. Sconce*.—4—6 inches high, remarkably horny and rigid, of an opaque bluish-purple colour. One of the most distinct and rarest of the British Algæ.

6. G. *aciculáris*, Lamour. (*sharp-pointed Gigartina*); frond cartilaginous cylindrical filiform irregularly dichotomous, branches divaricated beset with often unilateral patent acuminated ramuli, capsules sphærical sessile scattered.—*Grev. Alg. Brit. p.* 147. *t.* 16.—*Sphærococcus acicularis, Ag. Sp. Alg. v.* 1. *p.* 322.—*Fucus acicularis, Wulf.*—*Turn. Hist. Fuc. t.* 126. *E. Bot. t.* 2190.

Among the rejectamenta of the sea near Belfast, *Mr. Templeton*.—Rocks, Cornwall, *Mr. Rashleigh*. Several places in Devon, *Mrs. Griffiths*. Plymouth, and rocks in Cawsand Bay, *R. Sconce, Esq.* Sidmouth, *Miss Cutler* and *Mrs. Griffiths*. ♃. *Fructification* January.—2—4 inches in length, much spreading. Colour a deep reddish-purple. *Mrs. Griffiths* has favoured me with capsuliferous specimens and others with obscure, scattered granules in some of the ultimate ramuli; which are probably more evident in a recent state.

7. G. *Teedii,* Lamour. (*Teede's Gigartina*); frond subcartilaginous linear acuminated flat repeatedly pinnated with very narrow horizontal branches, the ultimate ramuli setaceous (bearing the sphærical capsules). *Sphærococcus Teedii, Ag. Sp. Alg. v.* 1. *p.* 277. *Grev. Crypt. Fl. t.* 356. — *Rhodomenia Teedii, Grev. Alg. Brit. p.* 96 — *Fucus Teedii, Roth, Cat. Bot.* 3. *p.* 138. *t.* 4. *Turn. Hist. Fuc. t.* 208.

In the sea, Lupton and Elberry Coves and Tor Abbey rocks, Torbay, *Mrs. Griffiths.* — Two to 4—5 inches long, very much branched, with the branches often opposite; not unfrequently the ramuli are secund. The beautiful and numerous specimens that I have received from Mrs. Griffiths are so copiously pinnated, that their appearance is very different from the figure of Roth and Turner. Much of the difference indeed may be occasioned by the former not being in fructification, in which state Mrs. Griffiths has never found it. That lady justly remarks that "this species is not in its place among the *Rhodomeniæ*, and that it comes much nearer to the *Gracilariæ* of Dr. Greville, especially *G. acicularis.*" Indeed I possess some small specimens of *G. acicularis* that can hardly be distinguished from a less ramified *G. Teedii.*

8. G. *Griffithsiæ,* Grev. (*Mrs. Griffith's Gigartina*); frond cartilaginous cylindrical filiform dichotomous throughout and fastigiate, fructification (?) oblong warts composed of moniliform filaments surrounding the stem. — *Grev. Alg. Brit. p.* 149. — *Sphærococcus Griffithsiæ, Ag. Sp. Alg. v.* 1. *p.* 316. — *Polyides Griffithsiæ, Gaill.* — *Fucus Griffithsiæ, Turn. Hist. Fuc. t.* 37. *E. Bot. t.* 1926.

Rocks in the sea, Torbay, and at Sidmouth, *Mrs. Griffiths.* Exmouth, *Miss Filmore* and *Rev. J. Jarvis.* Balbriggan, near Dublin, *Dr. Scott.* ☉. Autumn, Winter. — One to four inches long, slender, considerably resembling *Polyides rotundus* in miniature and having somewhat similar warts or tubercles, which appear destined to contain the fructification.

9. G. *plicáta,* Lamour. (*entangled Gigartina*); frond horny cylindrical filiform equal irregularly branched and bearing numerous ramuli which are obtuse and frequently secund, fructification oblong irregular warts composed of obscurely articulated filaments. — *Grev. Alg. Brit. p.* 150. — *Sphærococcus plicatus, Ag. Sp. Alg. v.* 1. *p.* 313. — *Fucus plicatus, Huds.* — *Turn. Syn. Fuc. t.* 323. *Hist. Fuc. t.* 180. *E. Bot. t.* 1089. — *Scytosiphon hippuroides, Lyngb. Hydroph. Dan. t.* 14. (according to Greville.)

Submarine rocks, very frequent. ♃. — A remarkably entangled, wiry species, the branches varying much in length.

35. Chóndrus. *Stackh.* Chondrus.

Frond cartilaginous, dilating upwards into flat, nerveless, dichotomously divided segments, of a purplish or livid colour. *Fructification;* subsphærical *capsules,* in the substance of the frond (rarely supported on little stalks), containing a mass of minute free *seeds. Grev. Alg. Brit. p.* 126. *t.* 15. — Name from

χονδρος, *cartilage;* from the cartilaginous substance of the frond.

1. C. *mammillósus*, Grev. (*mammillated Chondrus*); frond elongato-cuneiform dichotomous channelled proliferous, capsules sphærical on very short peduncles scattered over the disk of the frond.—*Grev. Alg. Brit.* 1. 127.—*Sphærococcus mammil., Ag. Sp. Alg. v.* 1. *p.* 260.—*Fucus mammil., Good. et Woodw.*—*Turn. Syn. Fuc. p.* 237. *Hist. Fuc. t.* 218. *E. Bot. t.* 1054.—*F. polymorphus, var. Lamour.*—*F. echinatus, Stackh.*—*F. ceranoides, ε and ζ. Lightf.*

Common on submarine rocks. ♃. Winter.

2. C. *crispus*, Lyngb. (*curled Chondrus*); frond flat nerveless dichotomous often curled the segments subcuneate, capsules hæmispherical occupying the disk on one side of the frond, and producing a depression on the opposite side.—*Grev. Alg. Brit. p.* 129. *t.* 15.—*C. polymorphus, Lamour.*—*Sphærococcus crispus, Ag. Sp. Alg. v.* 1. *p.* 256.—*Fucus crispus, Linn.*—*Turn. Syn. Fuc. p.* 226. *Hist. Fuc. t.* 216, 217. *E. Bot. t.* 2285.—*F. ceranoides, Gmel.*—*Lightf.*—*F. stellatus and lacerus, Stackh.*—*F. filiformis, Huds.*—*F. patens, Good. et Woodw.*

Rocky shores, abundant. ♃. Spring.—Variable as is this species in the length of its fronds, from 2 or 3 to 10 or 12 inches, in the degree of ramification, and in the relative breadth of the segments, yet the experienced eye will not find it difficult to recognise it. Mr. Turner enumerates the following vars.—β. *virens;* frond submembranaceous, branches dilated upwards, flattish, extreme segments long and acuminated. *Turn.*—γ. *stellatus;* frond submembranaceous, branches dilated upwards, divided at their apices into very numerous clustered short laciniæ. *Turn.*—δ. *æqualis;* frond cartilaginous, thick, all the branches equal, linear, the extreme segments obtuse. *Turn.*—ε. *filiformis;* frond cartilaginous, subcylindrical, branches nearly linear, apices long and acuminated. *Turn.*—ζ. *patens;* frond subcartilaginous, channelled on one side, dichotomous, angles of the dichotomies patent. *Turn.*—η. *lacerus;* frond cartilaginous compressed, apices very narrow, elongated, branched. *Turn.*—ϑ. *Sarniensis;* frond between coriaceous and cartilaginous, branches slightly channelled on one side, dilated upwards, apices rounded and emarginate. *Turn.*—ι. *planus;* frond subcoriaceous, flat, wide, branches linear, apices obtuse. *Turn.*—κ. *geniculatus;* frond cartilaginous, compressed, branches nearly linear, tubercles subglobose, black, frond bent, and often broken at the tubercles. *Turn.*—*Chondrus crispus* has been extensively collected on the coasts of Ireland, washed and bleached and employed for making blanc-mange, and for other purposes in lieu of Isinglass. It was at one time sold by the peasantry at 2*s.* per pound; but now that it is found to be so common, its value is much reduced.

3. C. *membranifólius*, Grev. (*membranous-leaved Chondrus*); stipes cylindrical filiform branched the branches expanding into subcuneate membranaceo-cartilaginous two-lobed or dichotomous segments, capsules ovate shortly pedunculated arising from the stipes.—*Grev. Alg. Brit. p.* 131.—*Sphærococcus membranif.,*

Ag. Sp. Alg. v. 1. *p.* 240.—*Fucus membranif., Good. et Woodw. Turn. Syn. Fuc. p.* 25. *Hist. Fuc. t.* 74. (*excel. var. ζ. roseus.*) *E. Bot. t.* 1965.—*F. fimbriatus, Huds.*

Submarine rocks on almost all our coasts. ♃. Winter.—Of this again Mr. Turner enumerates several varieties:—*α. lacer;* leaves dichotomous, segments linear, apices obtuse. *Turn.*—*γ. stellatus;* apices of the leaves cleft into very numerous narrow segments. *Turn.*—*δ. fimbriatus;* leaves fringed at the margin. *Turn.*—*ε. latifolius;* leaves membranaceous semi-orbicular, multifid in a palmate manner, segments shortish rounded at the apices. *Turn.*—*ζ. roseus;* stipes simple, expanded at its apex into a single, oblong, simple leaf. *Turn.*—*η. angustissimus;* leaves very narrow, nearly linear, irregularly divided, proliferous from the margin. *Turn.*

4. C. *Brodéii*, Grev. (*Mr. Brodie's Chondrus*); stipes cylindrical branched, the branches expanding into oblong membranaceo-cartilaginous simple or forked flat segments, capsules sphærical sessile upon the apices of the segments.—*Grev. Alg. Brit. p.* 133.—*Sphærococcus Brodiæi, Ag. Sp. Alg. p.* 239.—*Delesseria Brodiæi, Lamour.*—*Fucus Brodiæi, Turn. Hist. Fuc. t.* 72. *E. Bot. t.* 1966.—*β. simplex;* stipes short expanding into an oblong mostly simple or once forked rose-coloured frond. *Grev.*—*F. membranifolius, var. ζ. roseus, Turn.*

East coast of Scotland, on submarine rocks, frequent.—*β.* Coast of Devon, *Mrs. Griffiths.*—On the *var. β.* are frequently dark red spots in the disk of the frond, composed of a dense mass of moniliform filaments, which is deciduous, and leaves a scar behind.

36. Phyllóphora. *Grev.* Phyllophora.

Frond cartilaginous or membranaceous, of a purple rose-red colour, plane, proliferous from the disk, furnished with a more or less imperfect or obscure midrib. *Fructification;*—1. *Capsules* containing a mass of minute roundish free *seeds:*—2. *Sori* of simple *granules*, in little foliaceous processes. (In two species, the *nemathecia* of Agardh, or a thickened mass of jointed *filaments*, have been observed, but no granules.) *Grev. Alg. Brit. p.* 135. *t.* 15.—Name φυλλον, a *leaf*, and φορεω, to *bear*, from the proliferous nature of the frond.

1. P. *rúbens*, Grev. (*red Phyllophora*); stipes very short, expanding into a linear cuneate frond obscurely ribbed and repeatedly branched with proliferous shoots resembling the primary frond, capsules on the disk of the frond hemisphærical sessile very rugose. *Grev. Alg. Brit. p.* 135. *t.* 15.—*Sphærococcus rubens, Ag. Sp. Alg. v.* 1. *p.* 237.—*Chondrus rubens, Lyngb.*—*Delesseria rubens, Lamour.*—*Fucus rubens, Linn.*—*Turn. Syn. Fuc. p.* 216. *Hist. Fuc. t.* 12. *E. Bot. t.* 1053.—*F. prolifer, Lightf.*—*F. crispus, Huds.*

On the rocky coasts of England, frequent; rare in Scotland, and chiefly found on the west coast (*Lightfoot*). Appin, *Capt. Carmichael.* Orkney, *Rev. C. Clouston.* Among rejectamenta, in the Firth of Forth,

Dr. Greville. Belfast, *Dr. Drummond.* Miltown Malbay, *Mr. Harvey.* ♃. Winter.—Mr. Harvey's specimens of *Phyllophora rubens* are somewhat peculiar, more than 8 inches in length, very narrow, much curled, several times dichotomously divided, and in some the proliferous character is nearly obliterated by the primitive frond being much elongated and branched; no fructification, except *nemathecia* be considered such, has been found upon them.

37. Sphærocóccus. *Stackh.* Sphærococcus.

Frond cartilaginous, compressed, two-edged, linear, distichously branched. *Fructification;* mucronate *capsules*, containing a mass of ovate, shortly pedicellate, red *seeds*. *Grev. Alg. Brit. p.* 138. *t.* 15.—Name; σφαιρα, a *sphære* or *globe*, and κοκκος, *fruit*, from the globose fructifications.—Dr. Greville has confined the Genus *Sphærococcus* to the *Fucus coronopifolius*, Good. and Woodw., and the *F. crinitus*, Gmel.

1. S. *coronopifólius*, Ag. (*Swine's cress-leaved Sphærococcus*); frond cartilaginous much branched in a distichous and alternate manner compressed and two-edged below nearly flat upwards, the branches acute at the apex, capsules sphærical mucronate on little stalks fringing the smaller branches. *Gr.—Ag. Sp. Alg. v.* 1. *p.* 291. *Grev. Alg. Brit. p.* 138. *t.* 15.—*Gelidium coronopif., Lamour.—Desmia Hornemanni, Lyngb.—Fucus coronopifolius, Good. et Woodw.—Turn. Syn. Fuc. p.* 288. *Hist. Fuc. t.* 122. *E. Bot. t.* 1478.

Submarine rocks, chiefly on the extreme southern coasts of England. Isle of Bute, very rare, *Dr. Greville.* Near Belfast, *Mr. Templeton* and *Dr. Drummond.* Bantry Bay, *Miss Hutchins.* Miltown Malbay, *Mr. Harvey.* ♂. Autumn.

38. Gelídium. *Lamour.* Gelidium.

Frond between cartilaginous and horny, compressed, linear, more or less regularly pinnated. *Fructification:*—1. *capsules* imbedded in the substance of the ramuli, containing a mass of minute roundish *seeds:*—2. ternate or otherwise compound *granules*, in the ramuli, on distinct individuals. *Grev. Alg. Brit. p.* 139. *t.* 15.—Name; from the Latin *gelu, frost*, whence also *gelatine*, applicable to some of the species when boiled or macerated in warm water.

1. G. *cartilagíneum*, Grev. (*cartilaginous Gelidium*); frond horny nearly flat repeatedly pinnatifid with horizontal mostly alternate linear segments, the ultimate ones very short obtuse and bearing the mucronated capsules at their apices.—*Grev. Alg. Brit. p.* 140.—*G. concatenatum, and G. versicolor, Lamour.—Sphærococcus cartilagineus, Ag. Sp. Alg. v.* 1. *p.* 286.—*Fucus cartilagineus, Linn.—Turn. Syn. Fuc. p.* 284. *Hist. Fuc. t.* 224. *E. Bot. t.* 1477.

Fresh-water Bay, in the Isle of Wight, *Dr. Withering;* probably waft-

ed from other shores. ♃.—This is remarkable for its varied colours in a dried state.

2. G. *córneum*, Lamour. (*horny Gelidium*); frond between cartilaginous and horny nearly flat distichously branched, branches linear attenuated at each end pinnate and bipinnate, pinnules mostly opposite patent obtuse bearing within their apices elliptical capsules.—*Grev. Alg. Brit. p.* 141. *t.* 15.—*Sphærococcus corneus, Ag. Sp. Alg. v.* 1. *p.* 279.—*Fucus corneus, Huds.*—*Turn. Syn. Fuc. p.* 272. *Hist. Fuc. t.* 257. *E. Bot. t.* 1970.—*β. filicinum;* frond setaceous, pinnæ horizontal widened very blunt. *Turn.*—*F. filicinus, Huds.*—*F. nereidus, Lightf.*—*γ. pinnatum;* frond narrow tripinnate, pinnæ patent nearly linear bluntish. *Turn.*—*F. pinnatus, Huds*—*δ. uniforme;* all the pinnæ patent attenuated at the base obtuse at the points and scattered. *Turn*—*ε. capillaceum;* frond narrow, pinnæ clustered towards its summits nearly setaceous and somewhat erect. *Turn.*—*ζ. deforme;* frond twisted irregularly pinnated, pinnæ divaricated oblong very short undivided. *Turn.*—*η. sesquipedale;* frond long between compressed and flat linear tripinnate, ramuli linear-oblong short obtuse. *Turn.*—*κ. confertum;* frond compressed repeatedly pinnated, ramuli long very thin clustered irregularly divided. *Turn.*—λ. *attenuatum;* frond compressed in the lower part simply pinnated, in the upper tripinnate, ramuli extremely short somewhat acute, others obtuse. *Turn.*—*μ. pulchellum;* frond capillary compressed tripinnate, pinnæ between linear and clavate obtuse. *Turn.*—*ν. claviferum;* frond cylindrical capillary irregularly divided, ramuli obovate edged with minute scattered teeth. *Turn.*—*ξ. abnorme;* frond compressed irregularly branched naked in its lower part towards the middle generally bearing a few simple scattered pinnæ, and near the apices clusters of short deflexed ramuli. *Turn.*—*π. latifolium;* frond broad nearly flat, pinnæ linear-lanceolate mostly simple set with numerous short setaceous pinnulæ. *Grev.*—*ρ. aculeatum;* frond compressed very thin pinnated very irregularly divided and set with minute divaricate subulate ramuli crowded towards the summit of the frond. *Grev.*—*σ. clavatum;* frond capillary between cartilaginous and membranaceous decumbent creeping, ramuli in the form of inversely lanceolate or ovate leaves much attenuated at their insertion. *Grev. l. c.*—*Sphærococcus corneus, var. clavatus, Ag. Sp. Alg. v.* 1. *p.* 284.—*Gelidium clavatum and G. intricatum, Lamour.*—*Chondria pusilla, Hook. Fl. Scot. P. II. p.* 106. *Grev. Crypt. Fl. t.* 79.—*Fucus pusillus, Stackh.*—*Turn. Hist. Fuc. t.* 108.—*F. cæspitosus, Stackh.*—*τ. crinale;* frond setaceous subcylindrical somewhat dichotomously branched sometimes trichotomous at the top and bearing a few elliptical oblong ramuli attenuated at their insertion. *Grev. l. c.*—*Sphærococcus corneus, var. crinalis, Ag. Sp. Alg. v.* 1. *p.* 285.—*Fucus crinalis, Turn. Hist. Fuc. t.* 198.

Abundant upon the rocky coasts, every where, together with many of the varieties.—ζ. Exmouth, *Sir T. Frankland.*—ν. Peakhead, near Sidmouth, *Dr. Greville.*—μ. and ν. Bantry Bay, *Miss Hutchins.*—ξ. Cornwall, *Mrs. Griffiths.*—π. Cornwall and Devon, *Mrs. Griffiths.*—ρ. Mount's Bay, Cornwall, *Mrs. Griffiths.*—σ. Devon and Cornwall, *Mr. Stackhouse.* Sussex, *Mr. Borrer.* Firth of Forth, *Dr. Richardson.* Appin, abundant, *Capt. Carmichael.*—τ. Norfolk, *Mr. Turner.* Sidmouth, *Mrs. Griffiths.* Near Ilfracombe, *Mr. Hare.* Cornwall, *Mr. Rashleigh.* Brighton, *Mr. Borrer.* Belfast, *Mr. Templeton.* ♃. Summer.—This is perhaps the most variable of all our submersed Algæ, and few who have been accustomed to observe the plant on its native rocks at different seasons and in different localities, will hesitate in agreeing with Agardh, that the *Fucus pusillus* of Stackh., and *F. crinalis* of Turner, should be united with it. I have here adopted the British varieties of this plant, enumerated by Mr. Turner, and have added others from Dr. Greville.

39. Grateloupia. *Ag.* Grateloupia.

Frond cartilagineo-membranaceous, plane, somewhat pinnated with branchlets or fringed with foliaceous processes. *Fructification;* minute aggregated *tubercles* furnished with a pore, and containing a mass of free elliptical or roundish *seeds. Grev. Alg. Brit. p.* 151. *t.* 16.—Named in compliment to *Dr. Grateloup,* a French Algologist.

1. G. *filicína,* Ag. (*Fern-like Grateloupia*); frond linear attenuated simple or divided irregularly pinnated with ramuli attenuated at each extremity. *Grev. Sp. Alg. Brit. p.* 151. *t.* 16. —*Delesseria filicina, Lamour.*—*Fucus filicinus, Wulf.*—*Turn. Hist. Fuc. t.* 150.

On rocks and marine substances, Sidmouth and Ilfracombe, *Miss Cutler.* ♃.? *Fructification.* Autumn.—I have not had the good fortune to obtain British specimens of this rare plant, and I have only seen a solitary barren one in the possession of *Mr. Harvey.* Those in my Herbarium from the Mediterranean, gathered by Mr. Swainson, are of an olive-green colour, copiously once or twice pinnated and of a very lubricous texture so as to adhere firmly to paper when dry, well agreeing indeed with the figure and description of Mr. Turner, rather than with the Devonshire specimens, which are smaller, of a purplish red, and adhere but slightly to paper.

40. Chætóspora. *Ag.* Chætospora.

Frond subgelatinous, filiform, branched, rose-coloured, ultimate ramuli setaceous, swelling into lanceolate *receptacles,* composed of naked branched filaments radiating from an axis, in the centre of which is situated the obscure *fructification* (minute *seeds* or *capsules*). *Grev. Alg. Brit. p.* 153. *t.* 16.—Name; χαιτη, a *bristle,* and σπορα, a *sporule* or *seed;* in allusion to the fructification as connected with filaments.

1. C. *Wigghii,* Ag. (*Mr. Wigg's Chætospora*).—*Ag. Sp. Alg. p.* 146. *Grev. Alg. Brit. p.* 153. *t.* 16.—*Fucus Wighii,*

Turn. in Linn. Trans. v. 6. *p.* 135. *t.* 10. *Syn. Fuc. p.* 362. *Hist. Fuc. t.* 102. *E. Bot. t* 1165.

Only, I believe, seen among rejectamenta upon our shores and very rare. Yarmouth, *Mr. Wigg.* Brighton, *Mr. Borrer.* Folkstone, *Miss Everett.* Sidmouth, *Mrs. Griffiths* and *Miss Cutler.* Bantry, Ireland, *Miss Hutchins.* ☉. Summer.—A highly beautiful and curious plant, with the habit and much of the structure of *Mesogloia*, with which Miss Hutchins thought it ought to be arranged.

41. Ptilóta. *Ag.* Ptilota.

Frond compressed or flat, pectinato-pinnate, of a red colour, between membranaceous and cartilaginous. *Fructification* minute, aggregated: the *capsules* surrounded by an involucre. *Grev. Alg. Brit. p.* 154. *t.* 16.—Name; πτιλωτος, *pinnated;* from the extremely beautifully pinnated appearance of the richly coloured fronds.

1. P. *plumósa*, Ag. (*feathered Ptilota*); frond compressed cartilaginous much and irregularly branched, the branches repeatedly pectinato-pinnated, ramuli opposite bearing the fructification at their apices.—*Ag. Sp. Alg. v.* 1. *p.* 385. *Grev. Alg. Brit. p.* 155. *t.* 16.—*Plocamium plumosum, Lamour.*—*Fucus plumosus, Linn.*—*Turn. Syn. Fuc. p.* 296. *Hist. Fuc. t.* 60. *E. Bot. t.* 1308.—β. *capillaris;* frond very narrow, the segments nearly cylindrical jointed. *Turn. l. c. f. g.—h.*

Rocky sea-shores, frequent.—β. Not unfrequent on the perpendicular faces of rocks. ♃. Summer and Autumn.—A jointed appearance is visible in the young and tender parts of this plant, especially in an early state.

Tribe X. Gastrocarpeæ.

Plants all marine, with a scutate root, of a pink, red, or purplish-red colour, most of them not changing much on exposure to the atmosphere, of a carnose, gelatinoso-cartilaginous or gelatinoso-membranaceous substance: the structure consisting of a cellular external coat or membrane, and a pellucid gelatinous internal mass, mostly traversed by colourless jointed filaments arising from the outer membrane. Frond cylindrical, compressed or flat, continuous, destitute of midrib or veins. Fructification; roundish clusters or globules of red seeds, imbedded in the internal gelatinous substance of the frond, and often unaccompanied by any external pore. Grev.

42. Iridæa. *Bory.* Iridæa.

Frond flat, expanded, carnose or gelatinoso-cartilaginous, more or less of a purplish-red colour. *Fructification; globules* of roundish *seeds*, imbedded between the two coats of the frond. *Grev. Alg. Brit. p.* 157. *t.* 17.—Named from the *iridescent* hues displayed by many of the species when recent.

1. I. *edúlis*, Bory, (*esculent Iridæa*); frond subcartilaginous simple obovate or cuneiform rounded at the apex attenuated at the base into a short stipes.—*Grev. Alg. Brit. p.* 158. *t.* 17.—*Halymenia edulis, Ag. Sp. Alg. v.* 1. *p.* 202.—*Delesseria edulis, Lamour.*—*Ulva edulis, De Cand.*—*Fucus edulis, Stackh.*—*Turn. Syn. Fuc. p.* 180. *Hist. Fuc. t.* 114. *E. Bot. t.* 1307. *Hook. in Fl. Lond. N. Series, cum Ic.*

Abundant on the rocky shores. ♂. October.

(*Iridæa reniformis* of Bory and Dr. Greville, will be found under *Rhodomenia* in this volume.)

43. Halyménia. *Ag.* Halymenia.

Frond nearly flat or cylindrical, gelatinoso-membranaceous, of a pinky-red colour, more or less dichotomous, the segments often laciniated. *Fructification;* punctiform *globules* of *seeds*, imbedded in the central substance of the frond. *Grev. Alg. Brit. p.* 161. *t.* 17.—Name ἁλς, ἁλος, the *sea*, and ὑμην, a *membrane*, —*sea-membrane.*

1. H. *liguláta*, Ag. (*strap-shaped Halymenia*); frond gelatinoso-membranaceous almost plane irregularly dichotomous, the axils rounded, the segments ligulate attenuated towards the apex and often proliferous at the margin. *Grev.*—*Ag. Sp. Alg. v.* 1. *p.* 210. (and *H. elongata* of the same author). *Grev. Alg. Brit. p.* 162. *t.* 17.—*Ulva ligulata, Woodw.*—*E. Bot. t.* 429. —*Ulva rubra, Huds.*

Rocks and stones, chiefly on the southern coasts. Norfolk and Suffolk, and Anglesea. ⊙. Summer.

2. H. *furcelláta*, Ag. (*forked Halymenia*); frond gelatinoso-membranaceous cylindrical repeatedly and uniformly dichotomous the segments obtuse, not unfrequently proliferous.—*Ag. Sp. Alg. v.* 1. *p.* 212. *Grev. Alg. Brit. p.* 163.—*Ulva furcellata, Turn. in Schrad. Journ. v.* 2. *p.* 301. *E. Bot. t.* 1881.—*Dumontia triquetra, Lamour.*

Rocks in the sea, chiefly on the southern and eastern shores of England. Bantry Bay, *Miss Hutchins.*

44. Dumóntia. *Lamour.* Dumontia.

Frond cylindrical, simple or branched, membranaceous, tubular, gelatinous within, of a red or purplish-red colour. *Fructification; globules* of *seeds*, attached to the inner surface of the membrane of the frond. *Grev. Alg. Brit. p.* 164. *t.* 17.—Named in honour of *M. Dumont*, a contributor to the *Dictionnaire d'Hist. Naturelle.*

1. D. *filifórmis*, Grev. (*filiform Dumontia*); frond gelatinoso-membranaceous cylindrical attenuated at each extremity, pinnated with branches which are long scattered or subfastigiate simple and attenuated at their base.—*Grev. Alg. Brit. p.* 165. *t.* 17.—*Dumontia incrassata, Lamour.*—*Halymenia filiformis,*

Ag. Sp. Alg. v. 1. *p.* 214. — *Gastridium filiforme, Lyngb.* — *Ulva purpurascens, E. Bot. t.* 641. — *Ulva incrassata, U. spongiformis, and U. filiformis, Fl. Dan.* — *β. crispata;* frond compressed waved curled and twisted, of a brownish-purple colour. *Grev. l. c.* — *Halymenia purpurascens, var. crispata, Grev. Crypt. Fl. t.* 240.

On rocks and stones in the sea, frequent. — *β.* Firth of Forth, *Dr. Greville.* Firth of Clyde, at Helensburgh. ☉. Summer.

45. Catenélla. *Grev.* Catenella.

Fronds filiform, somewhat compressed, creeping, throwing up numerous branches, contracted, as if jointed, in a moniliform manner, composed interiorly of branched filaments radiating from the centre. *Fructification* unknown. *Grev. Alg. Brit. p.* 167. *t.* 17. — Name; *catenella*, a little chain, which its fronds resemble. — In deference to Dr. Greville, I adopt this Genus; but its fructification is wholly unknown. Mr. Harvey, too, observes in a letter to me, "I confess I would rather leave this plant in *Chondria* (*Gastridium*, Grev.) until the fructification be discovered, as it perfectly agrees with the other species in habit, and, unless I greatly err, in structure also. When at the coast I took some pains, struck with the similarity in habit between the *Gastridia* and *C. Opuntia*, to dissect, as minutely as I was able, the fronds of *G. articulatum*, as being the species most nearly allied (externally) to the plant in question; and the result was a conviction on my part that the structure was precisely similar. I found the pseudo-joints full of very lax gelatine, in which articulated filaments appeared to be loosely floating, fixed only to the periphery, though I presume, originating in a central point; but my instruments were not sufficiently delicate to dissect them without laceration; neither has Dr. Greville been able to do so with *C. Opuntia*. The filaments themselves are colourless, arachnoid, much branched in a dichotomous manner."

1. C. *Opúntia*, Grev. (*Opuntia-like Catenella*). — *Grev. Alg. Brit. p.* 166. *t.* 17. — *Chondria Opuntia, Hook. Scot. P. II. p.* 106. — *Halymenia Opuntia, Ag. Sp. Alg. v.* 1. *p.* 217. — *Gigartina Opuntia and pilosa, Lamour.* — *Rivularia Opuntia, E. Bot. t.* 1868. — *Chordaria Opuntia, Spreng.* — *Lomentaria Opuntia, Gaill.* — *Fucus Opuntia, Good. and Woodw.* — *Turn. Syn. Fuc. p.* 307. *Hist. Fuc. t.* 107. — *F. cæspitosus, Stackh.* — *F. repens, Lightf.* — *Ulva articulata, β. Huds.*

Frequent on the rocky shores of Great Britain. ♃. — From half an inch to an inch or more in length, densely matted, remarkably catenulated with the constrictions.

Tribe XI. Ulvaceæ.

Plants found in the sea, in fresh-water or on damp ground, &c., of an herbaceous green or fine purple colour, of a thin tender mem-

branaceous substance and reticulated structure, rarely gelatinous. Frond with a very minutely scutate root, expanded, or tubular and continuous. Fructification, roundish and mostly quaternate granules or minute sporular grains, imbedded in the delicate membrane of the frond.

46. PORPHÝRA. *Ag.* Porphyra, or Purple Laver.

Frond plane, exceedingly thin and of a purple colour. *Fructification;* — 1. scattered sori of oval *seeds;* — 2. roundish *granules,* mostly arranged in a quaternate manner, and covering the whole frond. *Grev. Alg. Brit. p.* 168. *t.* 18. — Name; πορφυρος, *purple;* in allusion to the colour of the fronds; — a beautiful Genus, distinguished by the delicacy and colour and glossy hue of the frond; the species of which I fear are too closely allied.

1. P. *laciniáta,* Ag. (*laciniated purple-Laver*); fronds aggregated deeply cleft the segments dilated, variously cut and waved. *Grev. Alg. Brit. p.* 168. — *Alga laciniata, Lightf. Scot. p.* 974. *t.* 33. *Ag. Sp. Alg. v.* 1. *p.* 104. — *Ulva umbilicalis, E. Bot. t.* 2296.

In the sea, on rocks, stones, Algæ and wood, abundant. ⊙. Spring to Autumn.—This, under the name of *Laver,* is much eaten in many places, especially the south of England, pickled with salt and preserved in jars, and, when brought to table, served up with lemon juice. According to Lightfoot, the inhabitants of the western isles gather it in the month of March, and after pounding and macerating it with a little water, eat it with pepper, vinegar, and butter. Others stew it with leeks and onions. — Dr. Greville describes the fructification, as — 1. roundish *granules* arranged in fours and covering the whole frond in which they are imbedded; and 2. *sori* of smaller ovate *granules* scattered without order chiefly towards the margin of the frond.

2. P. *vulgáris,* Ag. (*common purple-Laver*); frond ovato-lanceolate, the margins more or less waved. *Grev. Alg. Brit. p.* 169. — *Ulva purpurea, Roth, Cat. Bot. v.* 1. *t.* 6. *Ag. Sp. Alg. p.* 191. — *Ulva umbilicalis, Lightf.*

In the same situations as the preceding, from which I should fear it is not really different. ⊙. Spring to Autumn. — A foot or more long. Dr. Greville saw a specimen which measured 3 feet. The same author observes that the quaternate granules are smaller here than in the preceding species.

3. P.? *miniáta,* Ag. (*scarlet purple-Laver*); frond solitary plane oblong gelatinous red-rose colour. — *Ag. Syst. p.* 191. *Carm. MSS.* — *Ulva miniata, Lyngb. Hydroph. Dan. p.* 29. *t.* 6.

In the sea: coast of Appin, *Capt. Carmichael.* — "My only authority for claiming this plant as a native of these shores, was a fragment found floating in the sea. It was three inches in diameter, plane, curled on the margin, of a bright sanguineous colour, extremely gelatinous and filled with close-set roundish sporidia. When laid on paper to dry, it dissolved into a reddish sanies, being probably in a state of putrescence, and nothing remained but a mere stain. From its texture and fructification, it evidently does not belong to this genus." *Carm. MSS.*

4. P. *lineáris* Grev. (*narrow purple-Laver*); frond linear or linear-lanceolate acute, the margin nearly flat, *Grev. Alg. Brit. p.* 170. *t.* 18.— *Ulva purpurea, var. elongata, Lyngb. Hydroph. Dan. p.* 20.

Rocks beneath Peakhead, near Sidmouth, within high-water mark, *Greville*. At Dunmore, near Waterford, *Miss Anne Taylor*. ⊙. April and May.—3—5 inches high, supported on a very short stipes. Fructification, oval granules not arranged in a quaternate manner, but partly scattered and partly in lines.

47. Ulva. *Linn.* (*part of*). Ulva, or Green-Laver.

Frond membranaceous, of a green colour, plane (in some cases saccate, and inflated in the young state). *Fructification;* minute *granules*, most arranged in fours. *Grev. Alg. Brit. p.* 171. *t.* 18.—Name; according to Théis, from *Ul, water*, in Celtic; applied to some aquatic plant.

* *Marine species.*

1. U. *latíssima*, Linn. Suec. (*broad green-Laver*); frond plane widely oblong or roundish waved of a full green colour and very tender substance. *Grev.—Linn. Fl. Suec.* (not *Sp. Pl.*). *Ag. Sp. Alg. v.* 1. *p.* 607. *Grev. Alg. Brit. p.* 171.—*U. Lactuca, E. Bot. t.* 1551.—*U. Lactuca, var. latissima, Lightf. Scot.*

Abundant, on rocks, stones, &c. in the sea. ⊙. Summer and Autumn. —"Most authors consider this as a larger state only of the following. Both are, I believe, indiscriminately eaten under the name of *green-Laver*, or *Oyster-green*, being served at table with lemon-juice, in the same way as the *purple-Laver*. This diet is esteemed good, as almost all esculent vegetables are, for scrophulous habits. Lightfoot says that the islanders ascribe to it an anodyne virtue, and bind it about the forehead and temples to assuage headache in fevers, and to procure sleep.

2. U. *Lactúca*, Linn. (*Lettuce green-Laver*); frond at first obovate saccate inflated at length cleft down to the base, the segments plane unequal laciniated semitransparent. *Grev.—Ag. Sp. Alg. v.* 1. *p.* 409. *Grev. Crypt. Fl. t.* 313.

In the sea, on rocks and various marine substances. ⊙. May and June.

3. U. *Línza*, Linn. (*riband green-Laver*); frond linear-lanceolate attenuated at each extremity waved at the margin composed of two closely applied membranes. *Grev.—Ag. Sp. Alg. v.* 1. *p.* 413.—*Solenia Linza, Ag. Syst.*

Rocks and stones in the sea. ⊙. Summer.—The frond is peculiar, as Dr. Greville says, in being composed of a double membrane, so closely applied, indeed, as to appear but one. Hence Agardh arranges it with *Solenia* in his Systema Algarum. "This plant delights to grow in those gravelly spots where the fresh water oozes up during the ebb-tide. In such situations, it is not uncommon to find specimens 4 feet in length with a diameter not exceeding two inches." *Carm.*

** *Fresh-water species.*

4. U. *bullósa*, Roth. (*blistered green-Laver*); frond obovate saccate gelatinous at length irregularly expanded floating waved and bullate. *Grev. Ag. Sp. Alg. v.* 1. *p.* 414. *E. Bot. t.* 2320. —*Ulva Lactuca*, β. *Huds.*—*Lightf.*

Stagnant pools and ditches of fresh water. ⊙. Spring and Summer. —Much resembling *U. Lactuca*, but smaller, subgelatinous, lubricous, firmly adhering to paper, and excessively tender. Lightfoot observes that it has the appearance of being in a state of fermentation: and I have, myself, in the Flora Scotica, hazarded an opinion that its differences from the species just mentioned may arise from the different places of growth. It is very soft and lubricous. In its texture it seems to unite *Tetraspora* with *Ulva*.

*** *Terrestrial species or growing on walls and rocks.*

5. U. *crispa*, Lightf. (*crisped green-Laver*); fronds densely crowded inflated plaited and wrinkled with rounded lobes.—*Ag. Sp. Alg. p.* 116. *Grev. Alg. Brit. p.* 175.—*Ulva terrestris, Roth.*—*Ulva Lactuca*, γ. *Huds.*—*Dill. Musc. t.* 9. *f.* 6.

Shady walls, on thatched roofs, at the foot of walls, rocks, houses, &c., not unfrequent. ⊙. Winter and Spring.

6. U. *furfurácea*, Horn. (*furfuraceous green-Laver*); fronds very minute roundish-ovate distinct suberect, forming a thin crowded stratum. *Grev.*—*Fl. Dan. t.* 1489. *Lyngb. Hydroph. Dan. p.* 32. *Ag. Sp. Alg. v.* 1. *p.* 417. *Grev. Crypt. Fl. t.* 265. *Alg. Brit. p.* 176. *t.* 18.

On the tops of a few of the large boulders near the high-water line, and on a rock by the side of one of the lakes of Lismore, at all seasons, *Capt. Carmichael.* On the walls of King's College, Cambridge, *Rev. M. J. Berkeley.*—"Fronds closely tufted, forming a vivid green stratum, a yard or more in extent, 2—3 lines in length, erect, obovate, truncated and usually eroded at the top, tapering at the base into a longish claw, margin inflected, substance firm and void of lubricity. *Sporidia* in fours. It does not adhere to paper." *Carm. MSS.*

7. U.? *calophýlla*, Spreng. (*delicate green-Laver*); fronds cæspitose from a capillary base dilated into a membrane marked with 4—12 longitudinal lines, granules biseriate in each stria. *Carm.*—*Grev. Crypt. Fl. Synop. p.* 42. *Alg. Brit. p.* 176.—*Bangia calophylla, Carm. in Grev. Crypt. Fl. t.* 220.

On a stone, within 50 yards of the Manse door, Lismore; October; *Captain Carmichael.* On old decayed pieces of railing, attached to a cot-house in the Greenses, Berwick, *Dr. Johnston.*—"This very rare and beautiful Alga grows in considerable tufts of a vivid green colour, having the effect of a continued fleece covering the whole surface of the stone. Filaments about a line in length, form a capillary base, dilated into a lanceolate foliaceous membrane, generally flat, but sometimes *remarkably* twisted and marked with from 4 to 12 longitudinal stripes, each stripe consisting of a double series of globular granules." *Carm. MSS.*—Although arranged by Captain Carmichael among the *Bangiæ*,

it is but justice to his memory to state that he remarked in a note that this plant and *Bangia velutina* of Lyngbye were more nearly allied to the *Ulvæ*, than to the gelatinous *Bangiæ* of the 2d Division.

48. Tetráspora. *Link.* Tetraspora.

Frond tubular or inflated, gelatinous. *Fructification;* minute *granules*, loosely arranged in fours. *Ag.*—Name; τετρα, *four*, and σπορα, the *seed;* from the quaternary arrangement.

1. T. *lúbrica*, Ag. (*lubricous Tetraspora*); frond quite simple tubular subgelatinous waved and sinuated. *Ag. Syst. Alg. p.* 188.—*Ulva lubrica, Roth.*—*Ag. Sp. Alg. v.* 1. *p.* 415.—*Gastridium lubricum, Lyngb.*

In gently running fresh water. Hellesdon, Norfolk. Appin, *Captain Carmichael.*—This forms irregular masses of considerable extent, and is exceedingly lubricous.

2. T. *gelatinósa*, Desv. (*gelatinous Tetraspora*); frond vesicular ovate clavate very gelatinous. *Ag. Syst. Alg. p.* 138.—*Ulva gelatinosa, Vauch. Conf. p.* 244.

Fresh-water stream, Mucruss, Killarney, *Mr. Harvey.*—Of this I have seen no recent specimens. It is described as resembling Frog's spawn, but of a green colour, with sporules arranged in fours.

49. Enteromórpha. *Link.* Enteromorpha.

Frond tubular, hollow, membranaceous, of a green colour and reticulated structure. *Fructification;* three or four roundish *granules*, aggregated in the reticulations. *Grev. Alg. Brit. p.* 178. *t.* 18.—Name; εντερον, the *entrail*, and μορφη, a *form* or *appearance;* from the tubular and often more or less inflated fronds.

1. E. *Cornucópiæ, Carm.* (*Cornucopia-like Enteromorpha*); gregarious small, fronds tubular at the base, dilated upwards plaited laciniated and torn at the margin. *Carm. MSS.*—*Scytosiphon intestinalis, γ. Cornucopiæ, Lyngb. Hydroph. Dan. p.* 67. *Ag. Syst Alg. p.* 185.

On Corallines, &c., in rocky pools, frequent, *Captain Carmichael.* ☉. Spring, Summer.—"Fronds gregarious, about an inch long, funnel-shaped, from a short tubular base, extending into a plaited laciniated membrane, torn and jagged at the extremity. Granules in fours, all over the frond. Colour dark-green below, pale above."—"Without pushing the system of varieties to an extravagant length, this plant cannot be considered as a variety of *E. intestinalis;* the characters of the definition mark it as abundantly distinct, and to these characters it is universally constant. I look upon it, indeed, as a much more distinct species than *E. compressa;* specimens of which occur now and then very difficult to be distinguished from *E. intestinalis.*" *Carm. MSS.*

2. E. *intestinális*, Link, (*intestinal Enteromorpha*); fronds elongated broadly linear inflated and sinuated simple (often

floating). *Grev. Alg. Brit. p.* 179.—*Solenia intestinalis, and S. Bertoloni, Ag. Syst. Alg. p.* 185.—*Ulva intestinalis, Linn.* —*Ag. Sp. Alg. v.* 1. *p.* 418.—*Scytosiphon intest., Lyngb. β. crispa;* frond compressed, the margin crisped and curled. *Grev.* —*Solenia intestin., var. crispa, Ag.*—*Dill. Musc. t.* 9. *f.* 7.

On the sea-shore and in ditches and pools, both of salt and fresh water, frequent. ⊙. Spring, Summer.—" Fronds closely aggregated, swelling from a slender, filiform base to several lines in diameter rounded, inflated and puckered in various ways, a foot or more in length, of a membranous structure, and pale-green colour. The var. *crispa* generally grows solitary, attaining the length of 5—6 feet, and upwards of 2 inches in diameter. It decays gradually from the extremity downward, and on the edge of the decayed part, the granules are easily discernible, very minute, and with little or no interval between them." *Carm.*

3. E. *compréssa*, Grev. (*compressed Enteromorpha*); frond tubular linear or filiform simple or branched subcompressed the branches elongated attenuated at the base.—*Grev. Alg. Brit. p.* 180. *t.* 18.—*Solenia compressa, Ag. Syst. Alg. p.* 186. —*Ulva compressa, Linn.*—*Ag. Sp. Alg. v.* 1.—*β. prolifera;* frond somewhat inflated throwing out capillary branches on all sides. *Grev.*—*Ulva prolifera, Fl. Dan. t.* 762. *f.* 1.—*Scytosiphon compressus, var. crispatus, Lyngb. Hydroph. Dan. p.* 6.

On various substances in the sea, abundant. ⊙. Spring—Autumn. —" Fronds gregarious or tufted, from 6 inches to 3 feet or more in length, and from half a line to two inches in diameter, compressed or collapsed and wrinkled, almost naked, or sending off innumerable long slender simple branches chiefly from the margin. I am much inclined to the opinion expressed in the Flora Scotica of Dr. Hooker, that *S. intestinalis* is merely one of the numerous forms which this very variable species assumes, and which run so insensibly into each other, that any attempt to arrange them into varieties would prove equally difficult and useless." *Carm. MSS.*

4. E. *Linkiána*, Grev. (*Link's Enteromorpha*); frond cylindrical tubular filiform reticulated pellucid of a very pale green colour membranaceous (rigid when dry) much branched, branches attenuated. *Grev. Alg. Brit. p.* 182.

In the sea; on the coast of Appin, *Captain Carmichael.* ⊙. Summer. —The specimens of this in Captain Carmichael's Herbarium do not appear to me to differ from a not unfrequent state of *E. compressa*, except in being a little more rigid than is usual with that species.

5. E. *erécta*, (*erect Enteromorpha*); fronds latticed filiform tender, the branches and branchlets attenuated erect free. *Carm. MSS.*—*Scytosiphon erectus, Lyngb. Hydroph. Dan. p.* 63. *t.* 15.—*Solenia clathrata, var. confervoidea, Ag. Syst. Alg. p.* 187.—*Enteromorpha clathrata, β., Grev. Alg. Brit. p.* 181.

In the sea, on stones about half-tide level. Appin, rare, *Captain Carmichael.* Firth of Forth and Isle of Bute, *Dr. Greville.* ⊙. Spring. —" Fronds closely gregarious, 3—4 inches long, cylindrical, about the

thickness of a bristle, latticed, green and remarkably tenacious, branches scattered, long, erect, attenuated, transversely striated at the point, and perfectly free and disentangled." *Carm. MSS.*

6. E. *clathráta*, Grev. (*latticed Enteromorpha*); frond latticed filiform irregularly branched and interwoven, the branchlets divergent or recurved. *Carm.*—*S. clathrata*, α. *Grev. Alg. Brit. t.* 181.—*Solenia clathrata, Ag. Syst.*—*Ulva clathrata, Ag. Syn.*—*Conferva clathrata, Roth.*—*Scytosiphon paradoxus, Fl. Dan. t.* 1595. *f.* 2.—*Conferva paradoxa, Dillw. Brit. Conferv. Synop. p.* 70. *t. F. E. Bot. t.* 2328.

Sea-shores, Bangor, Brighton; Devonshire, *Mrs. Griffiths.* Spreading over the sand, Appin, *Capt. Carmichael.* ⊙. Spring—Autumn.—"Fronds several inches long, about the thickness of a bristle, smooth, cylindrical, very much branched and interwoven into a thin inextricable fleece, sometimes of great extent, branches exceedingly unequal, patent or recurved. Substance membranous, latticed, of a green colour. Agardh has made *E. erecta* a variety of this species. This is an easy way of getting over the ground, to be sure, to huddle plants together as mere varieties of each other; but the characteristics which distinguish these Algæ, are too decided to admit of their approximation; the one being erect, with long, equal, loose and disentangled branches, the other prostrate, with branches of all lengths interwoven into a matted web, If this difference of habit do not constitute a difference of species, where are we to look for such?" *Carm. MSS.*

7. E. *ramulósa*, (*branchletted Enteromorpha*); frond latticed compressed twisted divaricatedly, very much branched and interwoven, every where covered with spinulose branchlets, *Carm.*—*Ulva ramulosa, E. Bot. p.* 2137.—*Solenia echinata, Carm. MSS.*—*Enteromorpha clathrata*, γ. *uncinata, Grev. Alg. Brit. t.* 181.

In the sea. Bantry Bay, *Miss Hutchins.* Plymouth, *Mr. Sconce.* Spreading over sand, Appin, rare, *Capt. Carmichael.* ⊙. Spring.—"Fronds 5—6 inches to 1 and 2 feet long, ½ a line in diameter, compressed, curled and twisted, much and repeatedly branched and interwoven into a (more or less) thick and inextricable mat, and beset on all sides with short spine-like branchlets, or rather apiculi, which render it harsh to the touch. Substance membranous, green. This species can be distinguished at once from *E. clathrata*, with which alone there is any risk of its being confounded, by mere handling, the one feeling harsh and rough to the touch, the other soft and silky." *Carm. MSS.*—Notwithstanding the great stress my late valued friend, Capt. Carmichael, has laid upon the distinguishing characters of this and the two preceding species, other able Botanists think differently of their importance; and I must confess, that there are intermediate states of these plants, which would rather lead me to coincide with Dr. Greville and to unite them. In the ramification they are extremely variable, in the clathrate or latticed structure of the frond (by which they are distinguished from all others of the genus) very uniform and constant.

8. E.? *percúrsa*, (*Conferva-like Enteromorpha*); frond very slender capillary compressed marked with spurious reticulations and a central longitudinal line. *Carm. MSS.* (*sub Soleneam*),

cum Ic.—*Solenia percursa*, *Ag. Syst. Alg. p.* 187.—*Scytosiphon compressus*, *γ. confervoideus*, *Lyngb. Hydroph. Dan. p.* 65. *t.* 15. *f. B.* 4—6.

On the oozy sea-shore, above the half-tide level, and giving it a greenish hue to an indefinite extent. Appin, common, *Carm.* ⊙. Spring and Summer.—This appears to me to be a very dubious species of *Enteromorpha*.

50. Bangia. *Lyngb.* Bangia.

Frond flat, capillary, membranaceous, of a green, reddish or purple colour. *Fructification; granules* arranged more or less in a transverse manner. *Grev. Alg. Brit. p.* 177.—Named in honour of *Hoffman Bang*, a Danish Naturalist and Author of a work entitled "*De usu Confervarum in Œconomia Naturæ.*"—The proper place of this Genus is very doubtful. Most Botanists arrange it with the *Confervoideæ*, whence Dr. Greville has removed it and brought it near to *Ulva*, on account of its plane (though very narrow and filamentous) fronds. Mr. Harvey would rather follow Agardh, referring it to an Appendix of the *Oscillatorieæ*, or to a family immediately after them.

1. B. *fusco-purpúrea*, Lyngb. (*brownish-purple Bangia*); elongated simple, filaments purple or brownish-purple, often subtorulose straightish, granules about 5 in each fascia. *Lyngb. Hydroph. Dan. p.* 83. *t.* 24. *Grev. Alg. Brit. p.* 177.—*α.* fuscescens. *Conferva fusco-purpurea*, *Dillw. Conf. t.* 92. *E. Bot. t.* 2055.—*β. purpurea. Bangia atro-purpurea*, *Ag. Syst. Alg. p.* 76.—*Conferva atro-purpurea*, *Roth*, *Cat. Bot. v.* 3. *p.* 208. *t.* 6. *Dillw. Conf. t.* 103. *E. Bot. t.* 2085.

On rocks and wood in the sea, about high-water-mark:—*α.* Dunraven Castle, S. Wales, *Mr. Young.*—*β.* Chiefly in the south of England and Ireland. Meadfoot, Devon, *Mrs. Griffiths.* Within the Citadel, Plymouth, *Mr. Sconce.* Firth of Forth, *Dr. Greville.* ⊙. Spring, Summer.—One to 3 or 4 inches in length. The *var. β.*, of a rich and deep purple colour, is by far the most common with us.

2. B. *ciliáris*, (*fringed Bangia*); filaments gregarious very minute simple straight compressed purple, granules binate globose. *Carm. MSS. cum Ic.*

On the old leaves of *Zostera marina*, Appin, *Captain Carmichael.* ⊙. Spring.—This, the minutest of all the *Bangiæ*, "grows on the edges of the leaves in the form of a delicate pink-coloured fringe. *Filaments* half a line in length, gelatinous, straight, compressed, rather torulose. Granules large, globular, arranged in pairs." *Carm.*—The granules are occasionally in a single series, when the filaments are only half their usual breadth and the plant becomes a *Sphæroplæa* of Agardh (*Harvey*).

3. B. *Laminárieæ*, Lyngb. (*Laminaria Bangia*); filaments simple cæspitose equal olive-green, granules minute arranged in a double series of about 4.—*Lyngb. Hydroph. Dan. p.* 84. *t.* 24.

On *Ulva Lactuca*, Appin, rare, *Captain Carmichael.* ⊙. Autumn.—It occurs in stellated tufts, 2—3 lines in diameter. *Filaments* about 2 lines in length, straight, equal or a little broader at the point. *Granules* in double, approximated fasciæ, and generally 4 in each. *Carm.*

4. B.? *lætevírens*, Harv. (*bright-green Bangia*); filaments minute tufted flexuose attenuated to a subobtuse point bright-green, fasciæ close composed of innumerable minute granules. *Harv. MSS. cum Ic.*

On old fronds of *Enteromorpha intestinalis*, which grow on precipitous rocks at the extreme verge of high-water mark, Pavington, Miltown Malbay, Ireland, *Mr. Harvey.* ⊙. Summer.—"Filaments simple, minute, two or three lines in height, fascicled, many in the same tuft, lubricous, bright yellow-green, tapering to a subacute point, flaccid and slightly curved. *Fasciæ* rather broad, close, evidently containing granules, but so minute and numerous that it is impossible accurately to examine them. It is conspicuous on the old dull-coloured fronds of *Enteromorpha*, by its bright green colour. The genus of the present plant is far from certain in my mind, but I think it more nearly related to *Bangia* than to any other." *Harvey.*

5. B. *lacústris*, Carm. (*lacustrine Bangia*); filaments scattered decumbent branched deep green, the branches divaricated acute, fasciæ of ternate globose granules. *Carm. MSS. cum Ic.*

On the submerged leaves of aquatic plants, Appin, *Captain Carmichael.* ⊙. Summer.—"Filaments not exceeding a line in length, of a deep green colour, scattered, tortuous, creeping, and apparently fixed at or near the centre, attenuated at both ends and divaricatedly branched; sporidia globular, arranged in transverse series of 3 in the same filament, and 2 in the branches." *Carm.*

Tribe XII. Siphoneæ.

Plants found in the sea, in fresh-water or on damp ground, &c., of an herbaceous green colour. Frond either composed of membranaceous, filiform, continuous, simple or branched tubes, or formed of a combination of similar tubes, and then presenting a lax spongy body of various forms, crustaceous, globular, cylindrical or flat. Fructification; vesicles (coniocystæ, *Ag.*) *produced on the outer surface of the tubes, filled with a dark-green granular mass. Grev.*

51. Códium. *Stackh.* Codium.

Frond spongy, dark-green (crustaceous, globular, cylindrical or flat), composed of an interwoven mass of tubular continuous filaments. *Fructification;* opaque *vesicles*, attached to the filaments near the surface of the frond. *Grev. Alg. Brit. p.* 183. *t.* 19.—Name, κοδιον, the *skin* or *pelt* of an animal; from the soft and downy substance. The pellucid, almost horny cuticle of these plants, their general appearance and their smell when burnt, assimilate them to the lower orders of Animals.

1. C. *tomentósum*, Stackh. (*tomentose Codium*); frond cylindrical dichotomous. *Grev. Alg. Brit. p.* 185. *t.* 19. — *Spongodium toment., Lamour.* — *Fucus tomentosus, Huds.* — *Turn. Syn. Fuc. p.* 300., *Hist. Fuc. t.* 135. *E. Bot. t.* 712.

On rocks in the sea, chiefly on the extreme southern shores, and there abundantly. Coast of Durham and Yorkshire, probably rare. Iona, *Rev. M. J. Berkeley.* Staffa, and southwest of Ireland, *Mr. Harvey.* ♃. Summer.

2. C. *Búrsa*, Ag. (*Pouch Codium*); frond sphærical hollow. *Ag. Sp. Alg. v.* 1. *p.* 457. *Grev. Alg. Brit. p.* 186. — *Spongodium Bursa, Lamour.* — *Fucus Bursa, Turn. Hist. Fuc. t.* 136.

Submarine rocks, rare. Sussex ("*Pallas*"), Cornwall, *Mr. Rashleigh.* Devonshire, *Mrs. Griffiths.* Near Belfast, *Mr. Templeton.*

52. Bryópsis. *Lamour.* Bryopsis.

Frond membranaceous, filiform, tubular, cylindrical, glistening, branched; the branches imbricated, or distichous and pinnated, filled with a fine green minutely granuliferous fluid. *Grev. Alg. Brit. p.* 187. *t.* 19. — Name, *βρυον, a moss*, and *ωψις, an appearance*; — resembling some of the *feathered mosses.*

1. B. *plumósa*, Ag. (*feathered Bryopsis*); frond filiform branched naked below, the branches scattered spreading twice or thrice pinnated, the pinnæ pectinated. *Ag. Sp. Alg. v.* 1. *p.* 448. *Grev. Alg. Brit. p.* 187. *t.* 19. — *B. Lyngbyei, Fl. Dan. t.* 1063. *Lyngb. Hydroph. Dan. p.* 75. *t.* 19. — *B. composita, Ag. Sp. Alg. v.* 1. *p.* 451. (*Grev.*) — *Ulva plumosa, Huds.* — *E. Bot. t.* 2375.

Rocks, stones, and Algæ, in the sea, on various coasts of England, Scotland and Ireland. ☉. Summer and Autumn. — This graceful plant, of a delicate green colour, is liable to much variation in size and ramification, and in the situation of the pinnæ and pinnules, which are sometimes opposite and sometimes alternate; hence Agardh's *B. composita*, &c., and a *Bryopsis*, without name, thus characterized in Capt. Carmichael's MSS., "fronde 4—pinnata, pinnis pinnulisque alternis inferne nudis."

2. B. *hypnoídes*, Lamour. (*Hypnum-like Bryopsis*); frond slender very much branched, the branches long, the ramuli capillary irregularly inserted somewhat erect, the lower ones elongated. *Grev.* — *Lamour. Journ. Bot.* 1809. *p.* 135. *t.* 1. *f.* 2. *B. Arbuscula, Ag. Sp. Alg. v.* 1. *p.* 451.

On rocks and stones in the sea, Scotland. Southerness, Kircudbright, *Sir William Jardine, Bart.* Prestonpans, *Dr. Greville.* Appin, *Capt. Carmichael.* ☉. Summer and Autumn. — I have given this, (which Dr. Greville is by no means convinced is not a mere *variety* of the preceding, depending for its character upon the nearly erect irregular ramuli,) as a native of Appin, on the authority of Capt. Carmichael's MSS., where he distinguishes a *Bryopsis*, "filis ramosissimis, ramis imbricatis apicem versus ramulis erectiusculis plerumque simplicibus undique obsessis."

53. VAUCHÉRIA. *De Cand.* Vaucheria.

Fronds aggregated, tubular, continuous, capillary, coloured by an internal green pulverulent mass. *Fructification;* dark-green homogeneous *vesicles* (coniocystæ, *Ag.*) attached to the frond. *Grev. Alg. Brit. p.* 189. *t.* 19.—Named in compliment to the *Rev. T. P. Vaucher*, a minister of Geneva and very acute Botanist, who published a Monograph of this genus in his *Histoire des Conferves d'Eau douce*, under the name of *Ectosperma.*

* *Vesicles solitary.*

1. V. *dichótoma*, Ag. (*large dichotomous Vaucheria*); filaments dichotomous fastigiate the vesicles solitary globose sessile. *Grev.—Ag. Sp. Alg. v.* 1. *p.* 460. *Lyngb. Hydroph. Dan. p.* 75. *t.* 19. *Grev. Alg. Brit. p.* 190.—*Conferva dichotoma, Linn.—Dillw. Conf. t.* 15. *E. Bot. t.* 932.—*β. submarina;* frond more slender, the vesicles ovate or elliptical. *Grev.—Lyngb. Hydroph. Dan. p.* 76. *t.* 20.

Pools and ditches, generally of fresh water. *β.* In the sea, Weymouth, *Rev. M. J. Berkeley.* ☉. Spring and Summer. — The largest of this genus, often a foot or more long, sometimes filling up the ditches with its numerous filaments.

2. V. *velutína*, Ag. (*velvet Vaucheria*); filaments creeping, branches erect fastigiate woven into a velvety stratum, capsules solitary lateral. *Carm.—Ag. Syst. Alg. Addend. p.* 312. *Carm. MSS. cum Ic.*

On the muddy shore, flooded by the tide, Appin, *Capt. Carmichael.* Miltown Malbay, *Mr. Harvey.* ☉. Spring, Summer. — "Filaments exceedingly tough, interwoven into a dense velvety-green stratum, pellucid below and creeping over the mud; branches near the extremity, erect, fastigiate and more or less crooked. Capsules solitary, globular, on short lateral peduncles." *Carm. MSS.*

3. V. *marína*, Lyngb. (*marine Vaucheria*); filaments loosely tufted or distinct, branches few very long obtuse, vesicles solitary obovate pedicellate lateral. *Carm.— Lyngb. Hydroph. Dan. p.* 79. *t.* 22. *Ag. Sp. Alg. v.* 1. *p.* 73. *t.* 463. *Carm. MSS. cum Ic.*

On *Furcellaria lumbricalis*, Appin, extremely rare, *Capt. Carmichael.* ☉. Summer. — "This occurs in small, loosely floating tufts, an inch long. Filaments very slender and flaccid, filled for the most part with a green granuliferous fluid, but here and there empty and hyaline, the lower branches mostly fasciculate, upper ones single, erect, but with very wide axillæ. *Vesicles* few, scattered, lateral, obovate, shortly pedicelled, of a dark-brownish green, as are, in many instances, the branches. On drying, it assumes a deep shining green colour. From its exceedingly tough and flaccid texture, and its glossy dark-green hue, not to mention its habitat (so different from that of all the other species), there can be little doubt, I believe, that this plant belongs more properly to the Genus *Bryopsis* than to *Vaucheria.*" *Carm. MSS.* —Were *V. marina*, indeed, pinnated, as Mr. Harvey observes, it would be a *Bryopsis;* there is no other character to distinguish the genera.

4. V. *Dillwýnii*, Ag. (*Dillwyn's Vaucheria*); fronds branched flexuose, vesicles globose lateral sessile. — *Lyngb. Hydroph. Dan. p.* 77. *t.* 21. *Ag. Sp. Alg. v.* 1. *p.* 463. *Grev. Alg. Brit. p.* 191. *t.* 19. — *Ceramium Dillwynii, Roth.* — *Conferva frigida, Dillw. Conf. p.* 49.

On the ground in damp situations, common. ⊙. Spring and Autumn. — "It forms a very thin intricate fleece, of a green colour, creeping over the earth. Vesicles numerous, globular or slightly depressed, sessile or on short pedicles." *Carm. MSS.*

5. V. *terréstris*, De Cand. (*ground Vaucheria*); filaments straight forming a lax somewhat bristly stratum (upon the ground), vesicles lateral hemisphærical on the side of the horn-shaped peduncle or receptacle. *Grev.* — *Ag. Sp. Alg. v.* 1. *p.* 465. *Grev. Alg. Brit. p.* 191. — *Ectosperma terrestris, Vauch.*

On the ground, in moist shady places. ⊙. Spring. — "Frond more straight and rigid than in the preceding species, forming a more or less interwoven stratum, the summits of the little branches often erect and giving the whole a bristly appearance." *Grev.*

** *Vesicles 2 or more together.*

6. V. *séssilis*, De Cand. (*sessile-fruited Vaucheria*); fronds entangled in floating masses, vesicles oval sessile in pairs with an intermediate little horn-like process. *Grev.* — *E. Bot. t.* 1765. *Lyngb. Hydroph. Dan. p.* 80. *t.* 22. *Ag. Sp. Alg. v.* 1. *p.* 466. *Grev. Alg. Brit. p.* 192.

Pools and ditches, Sussex. ⊙. February.

7. V. *ornithocéphala*, Ag. (*Bird's-head Vaucheria*); filaments loosely branched and entangled in dense floating masses, vesicles unilateral binate or quaternate oblique upon short straight peduncles with a short beak and pellucid border. *Grev.* — *Ag. Sp. Alg. v.* 1. *p.* 467. *Hook. Fl. Scot. P. II. p.* 93. *Grev. Alg. Brit. p.* 193. — *Conferva vesicata, Dillw. Conf. t.* 74.

Pools and ditches. ⊙ Autumn.

8. V. *geminàta*, De Cand. (*twin-fruited Vaucheria*); fronds dichotomous very slender forming dense floating masses, vesicles ovate opposite laterally pedunculate on a horn-shaped process or receptacle. *Grev.* — *E. Bot. t.* 1766. *Lyngb. Hydroph. Dan. p.* 80. *t.* 23. *Ag. Sp. Alg. v.* 1. *p.* 467. *Grev. Alg. Brit. p.* 193. *t.* 19. — *Ectosperma geminata, Vauch. Conf. p.* 29. *t.* 2. *f.* 5.

Pools and stagnant waters. ⊙. Spring and Summer. — "This species forms an extremely dense green stratum, a foot or more in diameter; usually decaying in the middle and leaving there an empty space. Filaments dichotomous. Peduncles mostly on one side, in length about two diameters of the filament, bearing two opposite globular vesicles, with a straight (curled, or often reflexed, *Grev.*) intermediate process." *Carm. MSS.*

9. V. *cæspitósa*, Ag. (*tufted Vaucheria*); filaments cæspitose, branches secund fructiferous at the apex, vesicles sessile globose, intermediate horn-shaped process straight or curved. *Carm.*—*Lyngb. Hydroph. Dan. p.* 81. *t.* 23. *Hook. Scot. P. II. p.* 92. *Ag. Sp. Alg. v.* 1. *p.* 468. *Grev. Alg. Brit. p.* 194.—*Ectosperma cæspitosa, Vauch. Conf. p.* 26. *t.* 2. *f.* 4.—*Conferva amphibia, Dillw. Conf. t.* 41.

On damp earth. ⊙. Spring—Autumn.—"This occurs in a thin, green stratum, spreading over the earth and inseparable from it. Filaments short, flexuose, dichotomously branched; ramuli on one side, sub-erect, bearing two sessile globular vesicles, with a short, straight or often curved intermediate process." *Carm. MSS.*

54.? Botrýdium. *Wallr.* Botrydium.

Plant a sphærical vesicular *receptacle*, filled with a watery fluid, dehiscent at the apex, terminating below in a radicating tuft of fibres. *Grev. Alg. Brit. p.* 195. *t.* 19.—Name; βοτρυς, a *bunch of grapes*, which a cluster of the plants somewhat resembles.

1. B. *granulósum*, Grev. (*grain-like Botrydium*).—*Grev. Alg. Brit. p.* 196. *t.* 19.—*B. argillaceum, Wallr.*—*Vaucheria granulata, Lyngb. Hydroph. Dan. p.* 78.—*V. radicata, Ag. Sp. Alg. v.* 1. *p.* 465. *Hook. Scot. P. II. p.* 93.—*Ulva granulata, Linn.*—*Lightf.*—*Tremella granulata, Huds.*—*E. Bot. t.* 324.

On the ground, in moist shady situations, probably not uncommon, though few localities are published. ⊙. Spring and Autumn—Plants about the size of mustard-seed, aggregated, consisting of green vesicles sunk as it were into the soil, rooting below, filled with a fluid, which, "when pressed, descends into the root." (*Carm.*) The membranous coat has internally a number of small granules. In dry weather the upper part of the vesicles collapses, sinks in, and the vesicles become cup-shaped.

Tribe XIII. Lemanieæ.

Aquatic plants, existing in fresh and rapidly running water. Fronds slender, tubulose, either whorled with papillæ or moniliform, formed of a coriaceous cellular membrane, the cells regular, interspersed with cellular ducts. From scattered points obscurely conspicuous even externally, upon this membrane, and on its interior surface, there arise fascicles of minute, simple or dichotomous, moniliform, articulated threads; the articulations elliptical, being themselves the seeds or sporidia, separating in age and germinating. Ag.

55. Lemánia. *Bory.* Lemania.

Frond filiform, torulose or inflated at intervals, coriaceous, cellular. *Seeds* or *sporules* beaded, collected into pencil-shaped tufts, and fixed to the inner surface of the hollowed part of the frond.—Named in honour of a French Botanist and Algologist, *M. Leman.*

1. L. *fluviátilis*, Ag. (*River Lemania*); filaments branched olive-green torulose attenuated, intervals between the swellings cylindrical much longer than they are broad.—*Hook. Fl. Scot. P. II. p.* 84. *Ag. Sp. Alg. v.* 2. *p.* 4.—*Nodularia fluviatilis, Lyngb. Hydroph. Dan. p.* 99. *t.* 29.—*Chantransia fluviat., De Cand.*—*Polysperma fluviat., Vauch.*—*Conferva fluviat., Linn.*—*Dillw. Conf. t.* 29. *E. Bot. t.* 1763.—*Dill. Musc. t.* 7. *f.* 47.

Rocky beds of rivers, chiefly in mountainous countries. ⊙. Spring and Summer.—From 6 to 8 inches, occasionally to a foot in length according to Mr. Dillwyn, and frequently covering the rocky beds of subalpine streams with a dark olive-coloured mass.

2. L. *torulósa*, Ag. (*beaded Lemania*); filaments nearly simple moniliform.—*Ag. Act. Holm.* 1814. *t.* 2. *f.* 1.—*Conferva torulosa, Roth.*—*Dillw. Conf. Synops. p.* 77. *t. F. Dill. Musc. t.* 7. *f.* 48.—*C. fluviatilis, β. torulosa, Roth, Cat. v.* 1. *p.* 200. *E. Bot. t.* 1763.

Mountain-streams, near Ludlow, *Dillenius*. Anglesea, *Rev. H. Davies*. —I fear the more or less beaded appearance of the fronds will hardly afford a permanently distinguishing character between this and the preceding.

Div. II. CONFERVOIDEÆ.[1]

Plants filamentous, really or apparently articulated (destitute of definite gelatine). Gen. 56—84.

Tribe XIV. Ectocarpeæ.

Plants olivaceous or virescent, marine. Fructification monœcious; external capsules, and globules in swollen ramuli.

56. Cladóstephus. *Ag.* Cladostephus.

Filaments cartilaginous, inarticulate, whorled with short articulated ramuli, olivaceous. *Fruit* double;—1. ovate *capsules* furnished with a terminal pore; 2. *granules* imbedded in the apices of the *ramuli*.—Name, from κλαδος, a *branch*, and στεφος, a *crown*; in allusion to the *whorled* ramuli.—A small and natural genus; the *Dasytrichia* of some French writers.

1. C. *verticillátus*, Lyngb. (*whorled Milfoil Cladostephus*); ramuli regularly whorled sub-distant mostly forked.—*Lyngb. Hydroph. Dan. p.* 102. *t.* 30. *Hook. Scot.*—*C. Myriophyllum, Ag. Sp. Alg. v.* 2. *p.* 10.—*Conferva vertic., Dillw. Conf. t.* 55. *E. Bot. t.* 1718 *and t.* 2427. *f.* 2.

In the sea, on rocks and corallines, frequent.—*Filaments* 3—9 inches high. *Capsules* unknown. Mrs. Griffiths sends us individuals of this and the following species, in which some of the apices are minutely *sphacelate* and granuliferous. We find a similar appearance on Irish specimens.

2. C. *spongiósus*, Ag. (*Sponge-like Cladostephus*); ramuli ir-

[1] By W. H. Harvey, Esq.

regularly whorled imbricated mostly simple. — *Ag. Sp. Alg. v.* 2. *p.* 12. — *Conferva spongiosa, Dillw. Conf. t.* 42. *E. Bot. t.* 2427. *f.* 1.

On rocks, &c., in the sea, common. — Smaller than the last, with denser and more imbricated ramuli, and less divided and more clumsy branches. The ramuli are often forked.

57. Sphacelária. *Lyngb.* Sphacelaria.

Filaments jointed, branches distichous, rarely dichotomous, rigid. *Fruit* double, on the same individual; — 1. ovato-sphærical *capsules*, furnished with a terminal pore: 2. a granular *mass*, inclosed in the hyaline vesicated apices of the branches. — Name from Σφακελος, *gangrene;* aptly expressive of the withered, distended apices.

* *Filaments stuppose (beset with woolly fibres) at the base or lower part.*

1. S. *filicína*, Ag. (*Ferny Sphacelaria*); stuppose at the base, branches lanceolate decomposite pinnate, pinnæ alternate, pinnules fasciculato-multifid. — *Ag. Sp. Alg. v.* 2. *p.* 22. — *S. hypnoides, Grev. Crypt. Fl. t.* 348.

In the sea, very rare. — Plymouth (1822), *Mr. Sconce.* Ilfracombe, *Mrs. Griffiths* (1823) and *Mr. Hare.* Whitsand Bay, *Mr. Arnott.* Brighton, *Mr. Borrer.* — Greville's plate is admirably characteristic of British specimens; but foreign ones are much larger and more branched, with a good deal the habit of *S. disticha.* Mr. Borrer's have the branches and pinnæ very much divaricated, and the pinnules less finely cut than is usual.

2. S. *scopária*, Lyngb. (*broom-like Sphacelaria*); lower part stuppose and shaggy, upper branches broadly fasciculate rigid pinnate, pinnæ simple short spine-like alternate erect. — *Lyngb. Hydroph. Dan. p.* 104. *t.* 31. *Ag. Sp. Alg. v.* 2. *p.* 19. — *Conferva scoparia, Dillw. Conf. t.* 52. *E. Bot. t.* 1552.

In the sea, not uncommon in many places. — 2—6 inches high, harsh.

3. S. *dísticha*, Lyngb. (*shaggy-pinnated Sphacelaria*); stuppose at the base, much branched, secondary branches pinnate, pinnæ erecto-patent subulate alternate, the lower ones slightly divided. — *Lyngb. Hydroph. Dan. p.* 104. *t.* 31. *Ag. Sp. Alg. v.* 2. *p.* 26.

South coast of England, not rare? Firth of Forth, *Dr. Greville.* — 2—5 inches high, somewhat rigid; stems rising from a densely matted stuppose base, composed of woolly fibres, which also clothe their lower part, though in a much less degree than in *S. scoparia.* Branches long, erect, springing near the root and undivided, except at the top where they are often fasciculate, beset with short secondary branches or "plumules," which are once or twice pinnate. Colour greenish-olive. *Sphacelæ* small, truncate. — Often confounded with *S. plumosa* and *cirrhosa*, though more nearly allied to *S. filicina.*

** *Base of the filaments naked (without stuppa).*

4. S. *plumósa*, Lyngb. (*feathery Sphacelaria*); without stuppa, filaments elongated branched inarticulate pinnate, pinnæ very close simple pectinated elongated erecto-patent.—*Lyngb. Hydroph. Dan. p.* 103. *t.* 30. *Ag. Sp. Alg. v.* 2. *p.* 24.—*Ceramium pennatum, Fl. Dan. t.* 1481.—*Conferva pennata, E. Bot. t.* 2330. (*left-hand fig.*)

South coasts of England; rare? Firth of Forth, *Drs. Richardson and Greville.*—*Filaments* 2—4 inches high, tufted, flaccid when fresh, as thick as hog's bristles, naked at the base: *branches* irregularly set, the ultimate ones often fascicled, pinnated with very close, opposite, patent, perfectly simple ramuli, 2—3 lines long. *Colour* greenish-olive. A beautiful species, whose pinnated branches truly resemble delicate feathers. Notwithstanding its distinct characters, it has been often confounded with the following, as well as with *S. disticha.*

5. S. *cirrhósa*, Ag. (*small pinnate Sphacelaria*); filaments short without stuppa densely tufted articulated throughout, branches alternate irregularly pinnated.—*Ag. Sp. Alg. v.* 2. *p.* 27. —*S. pinnata, Lyngb. Hydroph. Dan. p.* 105. *t.* 31.—*Conferva pinnata, Dillw. Conf. t.* 86. *E. Bot. t.* 2330. (*right-hand fig.*)—β. *ægagropila;* filaments forming a dense round ball.—γ. *patentissima;* ramuli irregular, issuing at right angles. *Grev. Crypt. Fl. t.* 317.

On Fuci and corallines, very common.—γ. Shores of Bute, *Dr. Greville.*

6. S. *fúsca*, Ag. (*brown Sphacelaria*); "filaments brown," branches distant sub-alternate, ramuli patent clavate, articulations twice as long as broad, with a mesial transverse fascia. —*Dillw. Conf. t.* 95. *Ag. Sp. Alg. v.* 2. *p.* 34.

Shores of Wales, *Dillw.*—A very obscure plant, which I have never seen. It is probably one of the many varieties of *S. cirrhosa.*

7. S. *radícans*, (*creeping Sphacelaria*); filaments decumbent, sending out fibrous radicles in the lower part, with a few irregular simple straight naked branches.—*Conferva radicans, Dillw. Conf. Syn. p.* 57. *t. C. E. Bot. t.* 2138.—*S. cirrhosa,* ζ. *simplex, Ag. Sp. Alg. v.* 2. *p.* 29.

Sand-covered rocks, in various parts of Great Britain and Ireland; first noticed by *Miss Hutchins* at Bantry.—A very doubtful species. "Some of my specimens bear abundance of clustered sessile capsules. The *E. Bot.* figure is better than Dillwyn's; but the dissepiments are not pellucid in the living plant. It seems a more rigid and less branched plant than *S. olivacea*, and the joints are perhaps shorter; but I am by no means certain that the two are distinct." *Borr. MS.*

8. S. *olivácea*, Ag. (*olive Sphacelaria*); filaments short erect tufted sparingly branched, branches alternate simple.—*Ag. Sp.*

Alg. v. 2. *p.* 30.—*Conferva olivacea, Dillw. Syn. Conf. p.* 57. *t. C. E. Bot. t.* 2172.

On rocks and the larger Algæ. Orkney, *Messrs. Borrer and Hooker.* Appin, *Capt. Carmichael.* Dunmore, Ireland, *Miss Anne Taylor.*—Three lines to half an inch high, forming small tufts or patches. Agardh considers it to come nearest to *S. cirrhosa*, and to be perhaps not specifically distinct; in which opinion I am inclined to agree with him.

9. S. *racemósa*, Grev. (*racemose Sphacelaria*); filaments short tufted olivaceous dichotomous, capsules ovate racemose pedunculate." *Grev. Crypt. Fl. t.* 96. *Ag. Sp. Alg. v.* 2. *p.* 34.

Firth of Forth, *Dr. Richardson.*—Allied to the last; but larger. The branches, which Dr. Greville calls "dichotomous," appear from his figure to be alternate. The most remarkable character lies in the racemose capsules.

10. S. *velutína*, Grev. (*velvet-like Sphacelaria*); "olivaceous spreading velvet-like, filaments subsimple erect very short bearing capsules at the base, joints about equal in length and breadth." *Grev. Crypt. Fl. t.* 350.—*Linkia velutina, Carm. MSS.*

Parasitical on *Himanthalia lorea* and *Fucus serratus*, whose fronds it covers "in dark olivaceous velvety patches."—I admit this minute parasite into the present genus, where it is certainly an intruder, from respect to Dr. Greville's authority; though I confess I agree with Capt. Carmichael in considering it more allied to *Linkia* (*Myrionema*) *strangulans.*

58. Ectocárpus. *Lyngb.* Ectocarpus.

Filaments capillary, olivaceous or brown, flaccid, without longitudinal striæ. *Fruit*, sphærical or siliquæform *capsules*, and *granules* in swollen ramuli.—Name; εκτος, καρπος, *external fruit;* equally applicable to many other genera.

* *Secondary branches alternate, fascicled or secund.*

1. E. *littorális*, Lyngb. (*common Ectocarpus*); filaments densely tufted excessively branched, ultimate ramuli somewhat patent alternate or fascicled, capsules sphærical sessile—*Lyngb. Hydroph. Dan. p.* 130. *t.* 42, 43. *Ag. Sp. Alg. v.* 2. *p.* 40.—*Conferva littoralis, Dillw. Conferv. t.* 31. *E. Bot.* 2290.—*Lyngbya littor., Gaillon.*

On the larger *Algæ*, very common.

2. E. *siliculósus*, Lyngb. (*pod-fruited Ectocarpus*); filaments flaccid and slender tufted, ultimate ramuli erect subulate alternate or fascicled, siliquæ lanceolate.—*Lyngb. Hydroph. Dan. p.* 130. *t.* 43. *Ag. Sp. Alg. v.* 2. *p.* 37.—*Conferva siliculosa, Dillw. Syn. p.* 69. *t. E. E. Bot. t.* 2319.

Sea-shores, on Algæ, corallines, &c., common.—A most polymorphous species, of which Agardh enumerates 6 varieties. It is usually more slender and flaccid, and of a paler colour than the last; but scarcely

differs in ramification ; and the length of the joints in this genus is not to be depended on. The strongest character lies in the fruit.

3. E. *crinítus*, Carm. MSS. (*prostrate Ectocarpus*) ; filaments decumbent forming extensive strata sparingly branched, branches subsimple distant elongated, capsules globose scattered sessile.

Muddy sea-shores. " On the clayey bank of a rivulet a little below the flood-level at Appin," *Capt. Carmichael.* — Spreading over the mud in " extensive fleeces of a bright bay-colour ;" filaments about 2 inches long, with a few subsimple alternate attenuated branches. *Capsules* rare. When dry it has a slight gloss, and the colour changes to a dull, but rather pleasant green.

4. E. *tomentósus*, Lyngb. (*woolly Ectocarpus*) ; filaments flexuose very slender, woven into a dense sponge-like branching frond, siliquæ oblong obtuse. — *Lyngb. Hydroph. Dan. p.* 132. *t.* 44. *Ag. Sp. Alg. V.* 2. *p.* 44. *Grev. Crypt. Fl. t.* 316. — *Conferva tomentosa, Dillw. Conferv. t.* 56.

Sea-shores, not uncommon on many of the coasts. — Easily known by its *habit*, which something resembles that of *Codium tomentosum*.

5. E. *distórtus*, Carm. MSS. (*deformed Ectocarpus*) ; filaments much branched matted angulato-flexuose, branches patent with obtuse axillæ, ramuli divaricated or recurved obtuse spine-like, capsules obovate.

On *Zostera*, at Appin, *Capt. Carmichael.* — 4—8 inches long, densely matted, deep chestnut. *Filaments* bent into acute genuflexions, so as to appear distorted, branches spreading at obtuse angles, and beset with spine-like divaricating ramuli. *Capsules* scattered on the branches, obovate or elliptical, with a pellucid limbus, sessile or seated on short pedicels. Remarkably brittle in a dry state.

** *Secondary branches opposite.*

6. E. *granulósus*, Ag. (*granular Ectocarpus*) ; filaments excessively branched slender, upper branches short patent opposite, apices elongated and hyaline, capsules solitary elliptical. *Ag. Sp. Alg. v.* 2. *p.* 45. — *Conferva granulosa, E. Bot. t.* 2351.

On the southern shores of England. — In a *variety*, sent by Mrs. Griffiths, the ramuli are much crowded, fascicled and recurvo-patent, giving the plant a very feathery appearance to the naked eye. 3—10 inches long.

7. E. *sphæróphorus*, Carm. MSS. (*round-fruited Ectocarpus*) ; filaments slender tufted, upper branches patent opposite or in fours, capsules globose opposite to each other or to a branch. *E. brachiatus, Ag. Sp. Alg. v.* 2. *p.* 42. — (*not Conferva brachiata, of E. Bot.*)

On the larger Algæ, not rare ? Appin, *Capt. Carmichael.* Sidmouth, *Mrs. Griffiths.* — *Filaments* 1—3 inches long, pale chestnut or yellow-brown. This agrees in its ramification with an authentic specimen of *E. brachiatus*, Ag., but the filaments are coarser, which may depend on difference of locality, for we observe a similar variation between Scotch and Devonshire specimens. Agardh has never seen the capsules : — in

our plant they are abundant, and form one of its most striking characteristics.

8. E. *Merténsii*, Ag. (*Mertens' Ectocarpus*); distichous, filaments bipinnate, pinnæ and pinnulæ opposite unequal. *Ag. Sp. Alg. V.* 2. *p.* 47.—*Conferva Mertensii*, *E. Bot. t.* 999.

Sea-shore, very rare. Yarmouth, *Mr. Wigg.* Bantry Bay, *Miss Hutchins.* Coast of Durham, *Mr. W. Backhouse.* — *Filaments* 1—2 inches high, tufted, much branched, pale yellowish-olive, regularly bipinnated, the pinnulæ very slender, scarcely one-fourth the diameter of the branch. The only fruit which I have observed, consists in granules, imbedded in the swollen pinnulæ.

9. E. *brachiátus*, (*brachiate Ectocarpus*); "light brown very much branched slender wavy entangled, the branches opposite, crossing each other widely spreading with taper points, joints cylindrical twice as long as broad." *Sm.*—*E. cruciatus*, *Ag. Sp. Alg. v.* 2. *p.* 44.—*Conferva brachiata*, *E. Bot. t.* 2571.

In salt-marshes at Cley, Norfolk, *Messrs. Turner* and *Hooker.*—I am obliged to give the specific character of this plant (if it be indeed a distinct species) from *E. Bot.*, having no access to authentic specimens. Agardh has unaccountably altered the name to *cruciatus*, and conferred that of *brachiatus* on our *E. sphærophorus*.

Tribe XV. Ceramieæ.

Plants red or purple, rarely brown. Fructification double, diœcious;—1. *external capsules;* 2. *polymorphous receptacles or granules in swollen ramuli.*

59. Polysiphónia. *Grev.* Polysiphonia.

Filaments partially or generally articulate, longitudinally striated with internal parallel tubes. *Fruit* double.—1. ovate *capsules* furnished with a terminal pore; 2. *granules* immersed in distorted ramuli.—Name: πολυς, *many*, and σιφος, *a tube.*

A. *Main filaments inarticulate.*

1. P. *fruticulósa*, Grev. (*Shrubby Polysiphonia*); root creeping, filaments rigid inarticulate bushy, upper branches bi-tripinnate, lower ramuli squarrose, articulations of the ramuli half as long as broad, veins anastomosing.—*Fucus fruticulosus, Wulf.*—*Turn. Hist. Fuc. t.* 227. *E. Bot. t.* 1686.—*Hutchinsia Wulfenii*, *Ag. Sp. Alg. v.* 2. *p.* 95.

On sand-covered rocks; extreme southern coasts of England. Bantry Bay, common, *Miss Hutchins.* Appin, *Captain Carmichael.* Miltown Malbay, Ireland, abundantly, *W. H. Harvey.* — Mr. Arnott has communicated a very beautiful plant from Whitsand Bay, which, for the present, I consider a variety of this species, though not without some doubt that it may hereafter prove distinct. The same plant was found by Miss Hutchins at Bantry. The *fronds* are flat, 1—2 lines in breadth, sparingly and irregularly branched. *Branches* erect, with acute axillæ, set with short alternate distichous ramuli, 1—6 lines in length; the smaller

ones simple, the larger, again, pinnatifid ; pinnulæ broadly subulate, subacute. — The only fruit hitherto found on this variety consists in ternate granules, imbedded in the uppermost pinnulæ.

2. P. *Carmichæliána*, Harv. MSS. (*Carmichael's Polysiphonia*); filaments tufted rigid branched from the base, branches alternate inarticulate divaricating, ramuli subdichotomous very patent, their articulations as long as broad.—*P. divaricata, Carm. MSS.* (*not of Ag.*)

On *Desmarestia aculeata*, at Appin, *Captain Carmichael.* — *Filaments* tufted, 4 inches high, rigid, thicker than hog's bristles, branches scattered, issuing at right angles, ramuli sparingly divided, patent and divaricating. *Stem* and principal *branches* longitudinally striated, inarticulate, or towards the apex having an obscure appearance of joints ; articulations of the ramuli 2—4-striate, somewhat swollen at the joints. *Colour* " reddish-brown," changing to black in drying. *Fruit* unknown. In drying it adheres very imperfectly to paper. — A most distinct, and I think undescribed, species, of which I have only seen the single specimen found by Captain Carmichael.

3. *P. Brodiæi*, Grev. (*Brodie's Polysiphonia*); filaments continuous cartilaginous, branches alternately pinnated with spreading fasciculato-multifid flaccid ramuli, articulations of the ramuli rather longer than broad. —*Conferva Brodiæi, Dillw.— E. Bot. t* 2589.—*Hutchinsia Brodiæi, Ag. Sp. Alg. v.* 2. *p.* 63. —*β.* sub-simplex. *Hutch. penicellata, Ag. Sp. Alg. p.* 65.— *H. Brodiæi, Lyngb. Hydroph. Dan. t.* 33.

On marine rocks and the larger *Algæ*. Discovered by *James Brodie, of Brodie, Esq.*, near Forres. Abundant on various coasts of Scotland and the west and south of England. Very common on the west of Ireland. — One of the most beautiful of the genus, and easily recognised by its broadly fasciculate ramuli, and inarticulate stems. The substance is extremely flaccid and decomposes almost immediately in fresh water. Fruit of 2 kinds : 1. *Capsules* ovate, becoming contracted in the upper part into a short obtuse neck, reticulated, subsessile, including sphærical *seeds*. — 2. *granules* imbedded in distorted ramuli. — *β.* which we have from Captain Carmichael, who gathered his specimens at Staffa, differs from the usual state of the plant in being less branched, more rigid, of a darker colour and with more dense ramuli.

4. P. *Lyngbyéi*, Harv. (*Lyngbye's Polysiphonia*); main filaments thick cartilaginous inarticulate, ramuli elongate irregularly dichotomous very slender, crowded round the apices of the branches in broad fascicles, axillæ acute, articulations 2—4 times longer than broad.—*Hutchinsia Lyngbyei, Ag. Sp. v.* 2. *p.* 85.— *H. strictoides, Lyngb. Hydroph. Dan. p.* 114. *t.* 35. (*bad.*)

Shores of Bute, on the larger Algæ, *Dr. Greville.* — 6—10 inches high : main filaments as thick as those of *P. elongata*, cartilaginous, inarticulate, marked with short flexuose veins, not unlike the *lirellæ* of an *Opegrapha*, but wholly destitute of the appearance of dissepiments. Branches irregular, patent, sparingly divided, their lower part almost bare, the upper densely clothed with long, very slender, broadly fasciculate, crimson ramuli ; ramuli much branched, straight, irregularly dichotomous, not in the least attenuated at the base ; the axillæ very acute ; articu-

lations bi-tri-striate, rosy under the microscope, 2—4 or 5 times longer than broad ; dissepiments pellucid. Our specimens are without fruit.—Notwithstanding Lyngbye's figure represents the ramuli as less dense and the joints shorter than I find them on the specimens just described, I feel confident that our plants are similar, and that this species is perfectly distinct from *P. elongata*, to which it bears externally the closest resemblance.—It is well distinguished by the totally inarticulate main filaments, and the long jointed bi-striated ramuli, which are moreover not in the least attenuated at the base.—I place it (rather artificially) next to *P. Brodiæi*, on account of its inarticulate stems.

B. *filaments articulated throughout.*

* *Marked with two striæ.*

5. P. *fibráta*, (*bearded Polysiphonia*); filaments elongated setaceous gelatinous bi-striated flexuose loosely branched, ramuli dichotomous fasciculate, axils patent, upper articulations 2—3 times longer than broad, capsules ovate pedunculate.—*Conferva fibrata, Dillw. Conf. Syn. p.* 84. *t. G.* (*according to the original specimens.*)—*Hutchinsia roseola, Ag. Sp. Alg. v.* 2. *p.* 92.—*H. stricta, Ag. Syst. Alg.* (*not of Lyngb. ?*)

Sea-shores, on the larger Algæ ; Forres, *Mr. Brodie.* Cawsie, *Messrs. Borrer* and *Hooker.* Appin, *Captain Carmichael.* Brixham, Devon, *Mrs. Griffiths.*—Probably not uncommon. Filaments 2—10 inches long, thicker than hog's bristle at the base (in the Devonshire specimens), attenuated upwards to an extreme fineness, very flaccid and gelatinous, forming loose tufts; lower branches scattered, upper ones crowded, many times dichotomous and broadly fasciculate ; ramuli multifid, axils remarkably patent. *Articulations* variable, those of the stems 4—6, those of the branches 2—3 times longer than broad :—those of the ramuli very short.—Colour a fine purple-red, brighter on drying. *Fructification* of 2 kinds : 1. Capsules ovate, obtuse, dark-coloured, 4—5 times the diameter of the filament, when full grown, scattered over the upper ramuli and raised on short peduncles.—2. granules imbedded in distorted ramuli.—I consider this to be a very distinct species, though its characters are not easy to define in a few words. The habit in the larger specimens is very nearly that of *P. Brodiæi*, while in its microscopic character, this species approaches *P. stricta*. Of the correctness of my reference to Dillwyn, I am quite certain, having examined numerous authentic specimens : but I am not so sure that our plant is the *P. roseola* of Agardh, though I have a specimen from this author now before me.—It appears merely to differ in its diminutive size and slender filaments. But in our *P. fibrata* these characters are extremely variable:—Mr. Brodie's specimens are not two inches in length, while Mrs. Griffiths' largest ones are 10 or 12 inches.—The fibres at the apices, on which much stress is laid by Dillwyn, are nothing more than what occur in many other species.

6. P. *stricta*, Grev. (*straight Polysiphonia*); filaments densely cæspitose setaceous flaccid bi-striate dichotomous, branches and ramuli straight erect, axils acute, upper articulations 4—5 times longer than broad, capsules ovate sessile.—*Conferva stricta, Dillw. Conf. t.* 40.—*Hutchinsia stricta, Ag. Sp. Alg. v.* 2. *p.* 89.—*Lyngb. Hydroph. Dan. t.* 36 ?

On sand-covered rocks, not uncommon on any of our shores.—Root "a net-work of perennial creeping filaments" (*Carm.*), 2—10 inches high, forming densely entangled tufts of a dull red or purplish colour. Capsules and granules abundantly produced.

7. P. *urceoláta*, Grev. (*pitcher-fruited Polysiphonia*); filaments rigid cartilaginous much branched loosely entangled, branches dichotomous erecto-patent, middle articulations 4—5 times longer than broad, capsules urceolate shortly pedunculate.—*Conferva urceolata, Lightf. MSS.—Dillw. Conf. t. G.—E. Bot. t.* 2365.

On rocks and the larger Algæ, not uncommon.—3—9 inches high, dark-red, as thick as horse-hair at the base, loosely entangled in large bundles, of nearly equal diameter throughout. *Articulations* very variable, the *lowest* 5—6, *middle* 4—5 times longer than broad, the *ultimate* ones very short: *dissepiments* broad and hyaline. Substance rigid, and scarcely adhering to paper.—Such is the usual state of this plant; but Dr. Greville finds a *variety* (if it be only a variety) at the Isle of Bute, in which the filaments are scarcely a third of their usual diameter, excessively branched and adhering most closely to paper.

8. P. *pátens*, Grev. (*patent Polysiphonia*); filaments cartilaginous sparingly branched entangled beset with short patent recurved ramuli bi-striate, middle articulations 2—3 times longer than broad, capsules urceolate subsessile.—*Hutchinsia patens, Ag. Sp. Alg. v.* 2. *p.* 71.—*H. urceolata, Lyngb. Hydroph. Dan. t.* 34.—*Conf. patens, ? ? Dillw. Syn. Conf. p.* 83. *t. G.*

On the stems of *Laminaria digitata*, common.—3—8 inches high, thicker than horse-hair, loosely matted, dull red. *Stems* sparingly divided, but beset throughout their whole length with short patent branches; these are, again, more or less thickly furnished with short, remarkably recurved and squarrose ramuli, which constitute the most striking characteristic of the species: if indeed it be really distinct from *P. urceolata.* Whether this be the *Conf. patens* of Dillwyn or not, I am unable to determine, the only specimen of that species which I have seen being in a very young and imperfect state, and I am not aware that it was ever found in fruit.

** *Filaments polystriate.*

† *Rigid; striæ* 3, *ramuli spiniform.*

9. P. *spinulósa*, Grev. (*spinous Polysiphonia*); "dark red, branches divaricate somewhat rigid, the ramuli short straight subulate divaricate, articulations about equal in length and breadth, three-tubed." *Grev. Crypt. Fl. t.* 90.—*Hutchinsia spinulosa, Ag. Sp. Alg. v.* 2. *p.* 75.

Sea-shores, extremely rare. Appin, *Capt. Carmichael*, who only found one specimen.

10. P. *parasítica*, Grev. (*parasitic Polysiphonia*); rigid, branches distichous bi-tripinnate, pinnulæ alternate erect spiniform, articulations as long as broad three-tubed.—*Conferva parasitica, Huds.—E. Bot. t.* 1429. *Dillw. Conf. Syn. p.* 87.—

Hutchinsia parasitica, Ag. Sp. Alg. v. 2. p. 103.—*H. Mæstingii, Lyngb. Hydroph. Dan. t.* 36.

On the larger Algæ, and on rocks, rare. Coast of Yorkshire, Dorset and Cornwall, *Huds.* Bantry, *Miss Hutchins.* Firth of Forth, *Dr. Richardson.* — 1—2 inches high, slender, of a fine red, cartilaginous and scarcely adhering to paper. From every variety of *Ptilota plumosa* (some states of which it much resembles), this species may be known by the *alternate*, not opposite pinnules, and more rigid texture. The finest specimens I have gathered grew on the perpendicular faces of rocks, at the extreme ebb of spring-tides: and *Mr. Sconce* finds it in a similar locality at Plymouth.

†† *Rigid; dark red or brown, striæ numerous.*

11. P. *atro-rubéscens*, Grev. (*dark red Polysiphonia*); filaments elongated sparingly branched rigid, ramuli short subfasciculate or scattered subulate erect, lower articulations twice or thrice, upper ones half as long as broad, capsules ovate pedunculate or sessile.—*Conf. atro-rubescens, Dillw. Conf. t.* 70.—*C. nigra, Dillw. Conf. Syn. p.* 86. *E. Bot. t.* 2340.—*Hutchinsia atro-rubescens, Ag. Sp. Alg. v. 2. p.* 64.

On marine rocks, "far from uncommon on any of our shores," *Dillw.*—Confined principally to the southern parts of England. *Stems* tufted, often covering the rocks in large patches; 2—6 inches high, thicker than horse-hair, more or less furnished with short, subulate, erect ramuli; veins numerous, spiral. Colour deep red, often becoming blackish in drying, in which state it scarcely adheres to paper. Capsules subglobose, with a very wide truncated aperture, inclosing a tuft of pyriform seeds.

12. P. *Agardhiána*, Grev. (*Agardh's Polysiphonia*); filaments elongated much branched rigid, ramuli subfasciculate divaricating attenuated at each end, lower articulations twice or thrice as long, upper shorter than their diameter, "capsules" (???) "rotundato-convex quite sessile." *Grev. Crypt. Fl. t.* 210. *Ag. Sp. Alg. v. 2. p.* 66.

On marine rocks; Firth of Forth, *Dr. Greville.* Appin, *Capt. Carmichael.*—Dr. Greville has taken much pains to illustrate this species in his *Crypt. Flora*, and yet I am unable satisfactorily to distinguish it from *P. atro-rubescens*, though with the assistance of that author's own specimens. The character of the fusiform ramuli, on which Dr. Greville lays so much stress, is surely variable, even in the same tuft; and, as I cannot acknowledge the roundish bodies he calls "capsules," to be a *true capsular fruit*, I can place no dependence on any distinctions drawn from them.

13. P. *bádia*, Grev. (*deep-brown Polysiphonia*); filaments short subdichotomous rigid, branches elongate straight erect with very acute axillæ, ramuli few scattered, articulations uniform rather longer than broad.—*Conferva badia, Dillw. Conf. Syn. p.* 85. *t. G.*—*Hutchinsia badia, Hook. Scot. P. II. p.* 88., (*not of Agardh nor Lyngbye.*)

On marine rocks, near low-water mark, not uncommon.—Closely allied to *P. atro-rubescens*, of which I more than suspect it to be a *variety* or merely the young state. Fruit unknown.

14. P. *denudáta*, Grev. (*naked Polysiphonia*); filaments long rigid sparingly branched, branches distant naked with very patent axillæ, articulations uniform once and a half as long as broad.—*Conferva denudata, Dillw. Syn. Conf. p.* 85. *t. G.*—*Hutchinsia denudata, Ag. Sp. Alg. v.* 2. *p.* 73.

At Southampton, *Miss Biddulph.*—This, I have no doubt, is only a battered state of the last. The filaments are 4—6 inches long, with a few straggling branches.

15. P. *violácea*, Grev. (*purple Polysiphonia*); filaments flaccid much and fasciculately branched upwards, branches subdichotomous patent, ramuli scattered elongate subsimple, middle articulations 3—4 times upper twice as long as broad, capsules shortly pedicellate subovate.—*Hutchinsia violacea, Ag. Sp. Alg. v.* 2. *p.* 76.—*Lyngb. Hydroph. Dan. t.* 356. (*excl. fig. a.*)

On marine rocks, &c., probably common. Appin, *Capt. Carmichael.* Elberry Cove, Devon, *Mrs. Griffiths.*—3—4 inches high, sparingly branched at the base, much and somewhat fasciculately branched upwards, branches long, patent, subdichotomous, the secondary ones very erect, almost appressed, with roundish axillæ, ramuli elongated, virgate, straight, simple, or with a few ramular processes near the apex, often fibrillose. Articulations 5—7-striate, the basal ones very short, but rapidly elongating. Colour a dull red; substance flaccid and adhering to paper. Capsules shortly pedicellate, ovate or suburceolate, with an elongated but not contracted neck, scattered over the ramuli.

16. P. *nigréscens*, Grev. (*dark Polysiphonia*); filaments robust rigid below, much branched and bushy, ramuli crowded erect alternate subulate the uppermost fasciculate, lower articulations very short, upper rather longer than broad, capsules ovate sessile. *Conferva fucoides, Dillw. Conf. t.* 75. *E. Bot. t.* 1743.—*C. nigrescens, Dillw. Syn. Conf. p.* 81. *and E. Bot. t.* 1717.—*Hutchinsia nigrescens, Ag. Sp. Alg. v.* 2. *p.* 69.

On marine rocks, &c., common. A variable species; but easily distinguished by its bushy habit and *woody* stems, rough with broken branches. The only difference I can find between the *Conf. fucoides* and *nigrescens* of authors, lies in the habit; the one having more erect branches than the other; but this surely is of no importance in such variable plants.

17. P. *furcelláta* (*forked Polysiphonia*); filaments elongated tufted entangled flexuose repeatedly and closely dichotomous, axils broad rounded, ramuli erect, apices forcipate, middle articulations 3—5 times longer than broad.—*Hutchinsia furcellata, Ag. Sp. Alg. v.* 2. *p.* 91.

Floating in the sea, at Sidmouth, *Mrs. Griffiths* and *Miss Cutler.*—*Filaments* slender, 5—6 inches long, much entangled, and excessively branched, flexuose, the divisions dichotomous, very close toward the extremities. Articulations polystriate; striæ slender, sometimes cross-

ing each other; joints variable, those of the main stem 3—5 times, of the ramuli about twice, as long as broad. *Colour* when recent of a "bright brick red" (*Mrs. Griffiths*), changing in the herbarium to a deep umber brown: *substance*, according to the same lady, "at first firm, but becoming flaccid immediately." *Capsules* unknown. A most distinct and beautiful species.

18. P. *fastigiáta*, Grev. (*fastigiate Polysiphonia*); filaments rigid setaceous equal, many times dichotomous, axils patent, articulations shorter than their diameter.—*Conferva polymorpha, Dillw. Conf. t.* 44. *E. Bot. t.* 1764.—*Hutch. fastigiata, Ag. Sp. Alg. v.* 2. *p.* 67.

Parasitic on *Fucus nodosus, vesiculosus* and *serratus;* very common.—*Capt. Carmichael* finds this species frequently bearing tufts of very minute, lanceolate, yellow, pod-shaped bodies (*antheridia*) on the apices of the branches, in such abundance as quite to affect the colour of the plant. Similar bodies are occasionally seen on others of the Genus.

19. P. *Richardsóni*, Hook. MSS. (*Dr. Richardson's Polysiphonia*); filaments cartilaginous, branches elongate divaricating beset in the upper part with very patent straight subdichotomous ramuli, articulations of the stem and branches 2—3 times longer than broad irregularly veined, of the ramuli shorter, capsules sessile globose.

At Colvend, Dumfries, *Dr. Richardson.*—3—4 inches high, rigid, nearly as thick as hog's bristles at the base, branched throughout; branches alternate, often issuing at right angles. *Colour* a dull-red, becoming darker in drying. Main articulations marked with numerous anastomosing irregular tubes, those of the lower branches 3—5-tubed, of the ramuli 2—3-tubed. *Capsules* sessile, scattered, subglobose, with a very wide truncated aperture.

†††† *Filaments rigid, cartilaginous; ramuli flaccid, membranaceous.*

20. P. *elongáta*, Grev. (*Lobster-horn Polysiphonia*); filaments robust cartilaginous subdichotomous shrubby, ramuli slender attenuated at base fasciculate subterminal, articulations shorter than broad reticulated with veins.—*Conferva elongata, Dillw. Conf. t.* 33. *E. Bot. t.* 2429.—*Hutchinsia elong., Ag. Sp. Alg. v.* 2. *p.* 82.—*Ceramium elong., Lyngb. Hydroph. Dan. p.* 117. *Grev. Crypt. Edin. p.* 310.—β. *denudata;* filaments nearly opaque distorted beset with wart-like excrescences and destitute of ramuli. *Cer. brachygonium, Lyngb. Hydroph. Dan. t.* 36.—γ. *sanguinolenta;* ramuli mostly confined to the apices of the branches spreading in broad dense fasciculi, of a fine crimson colour. *Ag. Sp. Alg. p.* 85.—*P. rosea, Grev. Crypt. Edin. p.* 310. (*according to authentic specimens.*)

Sea-shore, on shells, stones, and corallines, &c., common.—β. and γ. found occasionally: their capsules very rare, but gathered abundantly at Appin by *Capt. Carmichael.*—A perfect Proteus, but easily recognized in

all its varieties by its robust stems (as thick as whipcord), anastomosing veins and basally attenuated ramuli.

21. P. *elongélla*, (*small Lobster-horn Polysiphonia*); filaments cartilaginous subdichotomous, axils patent, ramuli flaccid subfasciculate elongated not tapered at the base, articulations of the branches as long as broad marked with three parallel veins.

At Sidmouth, *Mrs. Griffiths* and *Miss Cutler*.—Filaments 2—3 inches high, in the lower part cartilaginous and as thick as hog's bristles, attenuated upwards to a capillary fineness; main branches subdistant, very patent or divaricated, ramuli rather crowded, in some plants penicellate, straight, dichotomous, slightly tapering towards the apex, not at all so towards the base: axils patent. Articulations visible in all the main branches, obscure near the root: veins all parallel. Colour below brownish, on the upper part rose-red. Capsules large, broadly ovate, sessile or shortly pedunculate, scattered on the upper ramuli, containing a tuft of pyriform seeds. Granules in distorted ramuli also occur. The capsules are extremely rare. To the naked eye this species precisely resembles a small specimen of *P. elongata;* but under the microscope the two are seen to be abundantly different.

22. P. *byssoides*, Grev. (*byssoid Polysiphonia*); filaments cartilaginous, branches decomposito-pinnate alternate patent crowded, ramuli capillary multifid single-tubed byssoid, articulations of the stem 3—4-striate 2—4 times as long as broad.—*Conferva byssoides, E. Bot. t.* 547. *Dillw. Conf. t.* 58.—*Hutchinsia byssoides, Ag. Sp. Alg. v.* 2. *p.* 99.

South and east of England, and east of Ireland, abundantly: very rare in Scotland or west of Ireland. Firth of Forth, *Dr. Richardson.*—A beautiful species, of a fine red colour, which, however, fades to dull brown in the herbarium; easily distinguished by the delicate, single-tubed, dichotomous fibres, which thickly clothe each joint of the penultimate branchlets.

23. P. *fibrillósa*, (*fibrillose Polysiphonia*); "filaments much branched veiny red, branches and ramuli scattered, the ultimate short multifid fibrilliform, lower articulations long upper short." *Dillw. Syn. Conf. p.* 86. *t. G.*—*Hutchinsia fibrillosa, Ag. Sp. Alg. v.* 2. *p.* 78.

At Brighton and Shoreham, *Mr. Borrer*. At Seaton, *Mrs. Griffiths*. Bantry Bay, *Miss Hutchins.*—This I have never seen in a recent state; but Mr. Borrer, its discoverer, makes the following remarks from fresh specimens:—"Very nearly allied to *Conferva byssoides*, but diffusely and irregularly branched, the main stem and primary branches as thick as in *C. rubra;* the joints of the secondary branches rather shorter in proportion to their diameter; capsules mostly on short stalks. The ultimate ramuli are very fine and tufted, like those of that species; but less numerous, more repeatedly dichotomous and less elongated at the points. Substance of the whole plant remarkably fragile, tender and subgelatinous. Colour pale rose-red, with a brownish tinge, becoming much darker in drying and in decay." (*Borr. MS.*)

60. DÁSYA. *Ag.* Dasya.

Main filaments inarticulate, cartilaginous, beset with articulated penicellate or pinnate ramuli. *Fructification* double:—1.

conico-acuminate *capsules*, furnished with a terminal pore: 2. lanceolate *receptacles* (*Stichidia*) containing *granules*, set in transverse fascia.—Name δασυς, *hairy;* in allusion to the slender ramuli.

1. D. *coccínea*, Ag. (*scarlet Dasya*); stems robust irregularly branched, branches bipinnate, pinnulæ fasciculato-multifid, articulations of the ramuli as long as broad.—*Ag. Sp. Alg.*—*Conferva coccinea, Dillw. Conf. t.* 36. *E. Bot t.* 1055.—*Hutchinsia coccinea, Ag. Syst. Alg. v.* 2. *p.* 119.—*Asperocaulon coccin., Grev. Crypt. Edin. p.* 307.—β. *tenuior* (*Dillw.*); more slender in all its parts.—γ. *denudata;* branches naked, ramuli squarrose minute subsimple. *Ceramium patens, Grev. Crypt. Fl. t.* 261. (according to authentic specimens.)

Abundant on the shores of England and Ireland; more rare in Scotland. Firth of Forth, *Dr. Greville.*—β. Devonshire, *Mrs. Griffiths.* Bantry Bay, *Miss Hutchins.*—γ. Appin, *Captain Carmichael.* Bute, *Dr. Greville.* Whitsand Bay, *Mr. Arnott.*—The variety γ., were it not that intermediate states occur, might easily be mistaken for a distinct species; but its characters merely result from accident or disease.

2. D. *ocellàta*, (*ocellated Dasya*); stems subsimple beset on all sides with long erecto-patent dichotomous penicellate ramuli, articulations 2—4 times longer than broad, receptacles lanceolate attenuate.—*Ceramium ocellatum, Grateloup.*—*Hutchinsia ocellata, Ag. Syst. Alg. p.* 158.—*Dasya simpliciuscula, Ag. Sp. Alg. v.* 2. *p.* 122.

On marine rocks, rare. Pier at Torquay, *Mrs. Griffiths.* Whitsand Bay, Cornwall, *Mr. Arnott.*—Stems tufted, 1—2 inches high, simple or with 3 or 4 branches, thickish, opaque, inarticulate, densely striated longitudinally, ramuli spreading on all sides, crowded towards the upper part, scattered below, 3 to 5 lines in length, articulate, several times dichotomous, the apices elongated. Lower articulations of the ramuli once or twice, upper 4—5 times longer than broad; apices obtuse. Colour a fine purple. Receptacles attenuato-lanceolate, acuminate, nearly as long as the ramuli, sessile or shortly pedicellate, seated in the dichotomies of the ramuli, containing dark purplish granules, closely set in transverse fasciæ. These receptacles are abundantly produced; the capsules I have never seen.

3. D. *Hutchínsiæ*, (*Miss Hutchins' Dasya*); stems much and irregularly branched beset on all sides with very short divaricating dichotomous ramuli, articulations about twice as long as broad, receptacles oblong suddenly acuminate.—*Conferva Arbuscula, Dillw. Conf. t. G.* (*excl. t.* 85.)

Bantry Bay, *Miss Hutchins.* Shores of Orkney and Caithness, *Messrs. Borrer* and *Hooker.* Miltown Malbay, and Kingstown Harbour, Dublin Bay, *W. H. Harvey.*—Stems tufted, 2—4 inches high, branches densely set with dichotomous divaricating ramuli, about a line in length, giving the plant a rounded appearance. Colour a pale reddish brown, substance flaccid. Fructification of 2 kinds:—1. Ovate capsules, with a produced subcylindrical neck, rather acute, discharging through a terminal pore roundish or pyriform seeds. 2. Receptacles oblong,

suddenly acuminate, or obtuse, with a mucro, containing ternate granules set in a double or triple series. Very distinct from the last in habit and character. A careful examination of original specimens enables me to refer Dillwyn's *tab. G.* (*C. Arbuscula*) which has created so much perplexity, to the present species, as well as so much of his description (*Syn. Conf. p.* 80.) as relates to the fruit. His t. 85., however, with the accompanying description, belongs to *Calithamnion Arbuscula.*

61. Cerámium. *Adans. Roth.* Ceramium.

Filaments articulated, mostly dichotomous, reticulated with veins: dissepiments opaque. *Fruit* double;—1. *capsules* with a membranaceous pericarp, containing numerous angular *seeds.* 2. simple oblong *granules* imbedded in the upper ramuli.—Name, κεραμος, *a little pitcher,* in allusion to the form of the capsules; but, as the genus now stands, the resemblance is not striking.—This is the *Boryna* of French authors.

1. C. *rúbrum,* Ag. (*red Ceramium*); filaments cartilaginous reticulated, articulations opaque, dissepiments contracted.—*Ag. Sp. Alg. v.* 2. *p.* 146.—*Conferva rubra, Dillw. Conf. t.* 34. *E. Bot. t.* 1166.—β. *Ceram. secundatum, Lyngb. Hydroph. Dan. t.* 37.

On rocks and Algæ, abundantly.—Very variable in ramification and colour; but easily distinguishable by the above characters.

2. C. *diáphanum,* Roth. (*variegated Ceramium*); filaments flaccid, articulations hyaline, joints swollen opaque.—*Ag. Sp. Alg. v.* 2. *p.* 150. *Conferva diaphana, Dillw. Conf. t.* 38. *E. Bot. t.* 1742.

Sea-shore, on various Algæ, "never on rocks," *Greville,* common.—Less variable than the last, and conspicuous among the Algæ for its beautifully variegated filaments.

3. C. *ciliátum,* Ducluz. (*spiny Ceramium*); filaments rigid fragile, joints furnished with whorled or solitary prickles.—*Ag. Sp. Alg. v.* 2. *p.* 153. *Conferva ciliata, Dillw. Conf. t.* 53. *E. Bot. t.* 2428.—β. *acanthonotum* (*Carm. MSS.*), ciliæ unilateral, solitary on the outer side of the articulations.

On rocks, corallines, &c., common.—β. Appin, *Capt. Carmichael.* Dunmore, near Waterford, *Miss Anne Taylor.*—A variable plant, but distinguished from either of the former by its *rigid* and *fragile* filaments, which, as *Mr. Sconce* well observes, "break in the hand, as if the joints separated like those of an *Equisetum.*"

62. Spyrídia. *Harv.* Spyridia.

Main filaments inarticulate, cartilaginous, beset with articulated ramuli; dissepiments opaque. *Fructification;*—1. triporous *capsules* with hyaline *pericarps* clustered round the bases of the ramuli: 2. pedunculated gelatinous *receptacles* with membranaceous *pericarps,* often surrounded by an involucre of short ramuli, containing two or three masses of roundish *granules.*—

Name; Σπυρις, a *basket;* in allusion to the appearance of the receptacles.

1. S. *filamentósa*, Harv. (*hairy Spyridia*).—*Fucus filamentosus, Wulfen.*—*Ceramium filamentosum, Ag. Sp. Alg. p.* 141.—*Conferva Griffithsiana, E. Bot. t.* 2312.

Southern shores of England. Southampton, *Miss Biddulph.* Torbay and Sidmouth, *Mrs. Griffiths.*— Stems tufted, many rising from a broadly expanded disk, thick, 2—6 inches high, irregularly branched, cartilaginous, densely cellular with an obscure appearance of articulation; branches beset with short, hair-like, simple or subdivided, scattered ramuli. Colour a light-red, fading to dull-brown. A highly curious plant, with the habit and structure of *Ceramium*, but approaching *Callithamnion* or *Griffithsia* in its fruit. It is found in the Indian and Pacific Oceans, as well as in the Mediterranean and British Seas.

63. Griffíthsia. *Ag.* Griffithsia.

Filaments articulated throughout, mostly dichotomous; dissepiments hyaline. *Fructification* double:—1. clustered *capsules* with hyaline *pericarps;* 2. roundish, gelatinous, involucrated *receptacles* (*favellæ*), including minute *granules.*—Named in honour of *Mrs. Griffiths* of Torquay, Devonshire, to whose numerous discoveries and accurate observations, the marine botany of Great Britain is indebted for much of its present advancement.

* *Branches whorled with ramuli.*

1. G. *equisetifólia*, Ag. (*imbricated Griffithsia*); filaments incrassated whorled with dichotomous incurved imbricated ramuli.—*Conferva equisetifolia, Dillw. Conf. t.* 54. *E. Bot. t.* 1479. —*G. equisetifolia, Ag. Sp. Alg. v.* 2. *p.* 133.

Abundant on the shores of England and the west of Ireland. Rare in Scotland. Firth of Forth, very rare, *Mr. Yalden.*—6—12 inches high, very robust, much branched; branches densely clothed with whorls of short ramuli, gradually tapered. Colour a deep-red. The fruit of this species is involved in much uncertainty. Dillwyn describes it as consisting of seeds, immersed in a pellucid jelly and surrounded by numerous filaments, which wholly envelop it. It was scattered over the branches and appeared to the naked eye like very young shoots. This was detected by the *Rev. G. R. Leathes*, at Yarmouth. Mr. Borrer finds "little yellowish brown oblong bodies, each surrounded by a pellucid limbus, scattered plentifully on the internal face of the ramuli of one specimen." On another specimen, he observed "minute pale-pink tufts, which appeared to grow, some laterally on the branches and some on the verticillate ramuli, whilst others terminated small young branches. The highest power of the microscope proved them to consist of two or three whorls of incurved ramuli, similar to those of the other parts of the plant, but very much more minute; to the inner side of which at the dissepiments are affixed the seeds (?), sometimes solitary, more frequently appearing clustered. These are globular, some of them dark-red throughout, without a limbus; others with a very wide limbus, the colouring matter forming merely a central speck." *Borr. in litt.*

2. G. *multífida*, Ag. (*multifid Griffithsia*); filaments slender, whorls distant, ramuli dichotomous incurved.—*Ag. Sp. Alg. v.* 2. *p.* 133.—*Conferva multifida, E. Bot. t.* 1816. *Dillw. Conf. Syn. p.* 75.—*β. pilifera; Ag.* branches distichous sub-opposite, ramuli elongated.

On many coasts of the south of England, *Mrs. Griffiths, Mr. Borrer,* &c. Bantry, *Miss Hutchins.* Miltown Malbay, *W. H. Harvey.*—*β.* at Torquay, *Mrs. Griffiths.*—2—6 inches high, slender, much branched rose-red. Articulations of the stem very long. *Capsules* minute, elliptical, with a broad pellucid limbus, sessile on the lower part of the ramuli, secund or opposite, occasionally tufted. *Favellæ* roundish, pedunculated and involucrated, containing minute granules. The capsules are rather rare, but Mrs. Griffiths has sent us fine specimens in this state.

** *Filaments dichotomous, naked.*

3. G. *barbáta*, Ag. (*pencilled Griffithsia*); filaments dichotomous setaceous, articulations 5—6 times as long as broad, the uppermost emitting long opposite multifid fibres.—*Ag. Sp. Alg. v.* 2. *p.* 132.—*Conferva barbata, E. Bot. t.* 1814. *Dillw. Conf. Syn. p.* 75.

Very rare. Beach at Brighton, *Mr. Borrer.*

4. G. *corállina*, Ag. (*Coral-like Griffithsia*); filaments thickish gelatinous dichotomous, axils patent, articulations swollen upwards, 2—4 times longer than their diameter. *Ag. Sp. Alg. v.* 2. *p.* 127.—*Conferva corallina, Dillw. Conf. t.* 98. *E. Bot. t.* 1815.

South of England, not uncommon: more rare in the north, and in Scotland. Hartly, Northumberland, *Mr. Winch.* Appin, *Capt. Carmichael.*

5. G. *setácea*, Ag. (*setaceous Griffithsia*); filaments dichotomous setaceous rigid straight, axils very acute, articulations cylindrical 5—6 times longer than broad. *Ag. Sp. Alg. v.* 2. *p.* 129.—*Conferva setacea, Dillw. Conf. t.* 82. *E. Bot. t.* 1689.

Sea-shore, not uncommon.—Mrs. Griffiths remarks, that on immersion in fresh water "it twists, the skin bursts with a slight explosion and emits the colouring matter which sinks in fine powder." Mr. Sconce has noticed a similar "irritability." *Involucres* raised on lateral clavate peduncles, 2—3 lines in length, their ramuli simple or forked, bearing, on the interior faces, minute, sphærical, crowded, trisporous capsules, furnished with very broad pellucid pericarps. *Favellæ* I have never seen, but Mrs. Griffiths communicates from Torbay, specimens producing a very extraordinary modification of fruit, resulting probably from disease; and Mr. Borrer informs me that a similar appearance was observed by Miss Biddulph many years ago, and communicated by her to Mr. Sowerby. This consists in minute ovate bodies, apparently composed of whorls of extremely slender filaments, invested with jelly and attached, like the capsules, to the interior faces of the *involucral bracteæ.*

64. Calithámnion. *Lyngb.* Calithamnion.

Filaments articulate, mostly pinnated, one-tubed; dissepiments

hyaline. *Fruit* double:—1. astomous *capsules* with hyaline pericarps, scattered on the ultimate ramuli: 2. roundish or lobed gelatinous *receptacles*, containing large granules, seated on the main branches.—Name: καλος, *beautiful*, and θαμνος, *a shrub*. —A most beautiful and natural, but very difficult genus, forming endless species and varieties. In the parts of fructification it scarcely differs from *Griffithsia*.

A. *Ramuli opposite.*

a. *Erect, much branched, root scutate.*

1. C. *Plúmula*, Lyngb. (*pectinated Calithamnion*); ramuli short opposite recurved pectinated in their upper margins.—*Lyngb. Hydroph. Dan. p.* 127. (*excl. var.* β.) *Ag. Sp. Alg. v.* 2. *p.* 159.—*Conferva Plumula, Dillw. Conf. t.* 50.—*C. Turneri, E. Bot. t.* 1637. (*not t.* 2339.)

Sea-shores, from Orkney to Devon; frequent in many places.—A beautiful species, easily known by its very peculiar and symmetrical ramuli. Mrs. Griffiths finds a *variety*, smaller in every part. The *favellæ* are large, lobed and clustered.

2. C. *cruciátum*, Ag. (*cruciated Calithamnion*); ramuli elongated opposite or quaternate slender pinnated, pinnæ long very erect, main articulations 4—5 times longer than broad.—*Ag. Sp. Alg. v.* 2. *p.* 160.

Pier, Torquay, *Mrs. Griffiths.*—1—3 inches high, densely tufted, sparingly branched; branches long, erect and subsimple, their apices (to the naked eye) dark and obtuse, beset for their whole length with opposite or quaternate pinnated ramuli, a line in length. *Colour* a dull brownish-red. *Capsules* elliptical, dark-red, trisporous, borne on the tips of abbreviated pinnules. *Favellæ* unknown.

3. C. *púmilum*, Harv. MSS. (*slender cruciated Calithamnion*); ramuli very short opposite pinnated, pinnæ abbreviated close very erect, main articulations 2—3 times longer than broad.

At Miltown Malbay, *W. H. Harvey.*—Resembling the last in miniature. *Filaments* rarely an inch high, sparingly and distantly branched, each articulation furnished with a pair of very short, pinnated *ramuli*, which are crowded toward the apices of the branches: *fruit* unknown.

b. *Filaments creeping, throwing up erect branches or stems.*

4. C. *Turnéri*, Ag. (*Turner's Calithamnion*); filaments creeping, stems erect simple or slightly branched oppositely pinnated, articulations of the stem 5—10 times longer than broad.—*Ag. Sp. Alg. v.* 2. *p.* 160.—*Conferva Turneri, Dillw. Conf. t.* 100. *E. Bot. t.* 2339. (*not t.* 1637.)—*Ceramium Turneri, Grev. Crypt. Fl. t.* 355.—*Calithamnion variabile, Ag. Sp. Alg. v.* 2. *p.* 163. (*according to specimens from the author*).

On the larger *Algæ;* not uncommon on many shores of England and Ireland, rare in Scotland. Near Berwick, *Dr. Johnston.*—Agardh's *Calithamnion variabile*, which I have gathered abundantly in Dublin bay, differs from the usual state of the plant in being more branched, and

less regularly pinnated with shorter joints; but the two extremes may be traced into each other. The *favellæ* of this species are involucrated, pedicellated, and precisely resemble those of a *Griffithsia;* but the habit and affinities are like *Calithamnion.*

5. C. *Plúma*, Ag. (*feathery Calithamnion*); filaments creeping, stems erect subsimple naked below, the upper half oppositely pinnate, pinnæ erect appressed, articulations of the stem 2—4 times longer than broad.—*Ag. Sp. Alg. v.* 2. *p.* 162.—*Conferva Pluma, Dillw. Conf. Syn. p.* 72. *t. F.*

On the stems of *Laminaria digitata*, common; first observed by the late *Miss Hutchins* at Bantry.—*Capsules* similar to those of *C. Turneri.*

B. *Ramuli alternate, pinnated or dichotomous.*

a. *Secondary branches pinnated or plumulate.*

1. *Main-stems inarticulate.*

6. C. *Arbúscula*, Lyngb. (*shrubby Calithamnion*); stems naked below robust cartilaginous, main branches papillose with short imbricato-plumulate branchlets, ultimate pinnules divaricated subsimple attenuate acute, capsules lining the inner faces of the pinnules.—*Lyngb. Hydroph. Dan. t.* 38. *f.* 1, 2, 3. (*excl. fig.* 4, 5, 6.)—*Conferva Arbuscula, R. Brown.—Dillw. Conf. t.* 85. (*not t. G.*)—*E. Bot. t.* 1916?—*Dasya Arbuscula* and *spongiosa, Ag. Sp. Alg. v.* 2. *p.* 121.—*Asperocaulon Arbusc., Grev. Fl. Crypt. Edin. p.* 307.

On rocks and stones, in the sea. Abundant on the west of Ireland and Scotland. Very rare on the east of Scotland. Firth of Forth, *Messrs. Greville* and *Arnott.*—*Stems* subsolitary, as thick as a small quill, destitute of branches and densely pilose in the lower part: 4—8 inches high. *Lesser branches* thickly clothed on all sides with minute imbricated plumules. *Colour* a fine claret. *Capsules* sphærical, sessile, with a broad limbus. *Favellæ* roundish-ovate, or irregularly lobed, mostly in pairs. The figure in *E. Bot.* is not very characteristic.

7. C. *Brodiæ'i*, Harv. MSS. (*Brodie's Calithamnion*); stem subopaque spuriously articulated slender, branches laxly set with short elliptical quadrifarious plumules, ultimate pinnules spreading obtuse subsimple, capsules roundish sessile on the ramuli mostly solitary.—*C. purpurascens? Brodie MSS.*

On *Algæ*, at Forres, *Mr. Brodie.* Coast of Northumberland, *Mr. Robertson.* Torquay, *Mrs. Griffiths* and *Miss Cutler.*—1—3 inches high, cartilaginous, thrice as thick as hog's bristle at the base, gradually attenuated, tufted; *branches* quadrifarious. *Plumules* 1—2 lines long, elliptical, rounded at the top, pinnæ scarcely tapered, very obtuse, simple or subramulose near the apex, erecto-patent. Colour pale brownish-red. Main-stem inarticulated, longitudinally striated, branches subopaque with obscure articulations, twice as long as broad, articulations of the ramuli rather shorter. *Capsules* alternate or opposite, seated near the top of the pinnules. *Favellæ* sometimes produced on the same frond, or even the same branch as the capsules. Such is Brodie's plant. Mrs. Griffiths sends us some beautiful individuals from Torquay, which, though

they do not precisely agree in all the above particulars, yet resemble the Scottish specimens so nearly, that we are afraid to describe them as distinct. They are more slender in all parts, and the main-stems are sub-articulate. *C. Brodiæi* has much the habit of a small specimen of *C. tetragonum*, but comes nearer in character to *C. Arbuscula*.

8. C. *Hookéri*, Ag. (*Hooker's Calithamnion*); stem and branches thick cartilaginous inarticulate laxly set with short subovate plumules, pinnæ flexuose patent subsimple very slender acuminated, capsules subsolitary seated near the base of the lowermost pinnæ. — *Ag. Sp. Alg. v.* 2. *p.* 179? — *Conferva Hookeri, Dillw. Conf. t.* 106.

Sea-shore, very rare. Cawsie, *Messrs. Hooker and Borrer.* Holyhead, *Rev. H. Davies.* — Dillwyn's figure is very characteristic.

9. C. *lanósum*, Harv. (*woolly Calithamnion*); stem inarticulate slender, branches jointed excessively divided entangled flexuose spreading, plumules crowded quadrifarious broadly ovate obtuse, lower pinnæ divaricated, upper spreading and subpinnulate, articulations of the branches 2—3 times longer than broad, of the pinnæ shorter, capsules subsolitary.

Sea-shores. Tor Abbey, *Mrs. Griffiths.* Killiney, *W. H. Harvey.*— 1—3 inches high, flaccid, excessively branched, somewhat woolly and entangled; branches very flexuose, closely plumulate; pinnæ very patent and divaricating. *Main-stem* nearly opaque, longitudinally striated. *Favellæ* large, irregularly ovate, dark-red. In drying, this species fades to a dull pink, wholly without gloss. On re-immersion, it is extremely fragile, and quickly gives out its colour. The habit is more that of *C. roseum* than of any species in this division, but its inarticulate stem gives it a place here.

2. *Main-stems more or less distinctly articulate.*

* *Plumules lax, ovate, lanceolate or irregular, subsimply pinnate.*

10. C. *róseum*, Ag. (*rosy Calithamnion*); much and loosely branched, plumules elliptic-oblong rounded crowded towards the tops of the branches, pinnæ long patent subsimple and flexuose, main articulations 4—5 times, of the pinnæ 2—3 times, longer than broad, capsules elliptical scattered near the base of the pinnæ. — *Ag. Sp. Alg. v.* 2. *p.* 164. — *Conferva rosea, E. Bot. t.* 966. *Dillw. Conf. t.* 17? — *Ceramium roseum, Roth, Cat. Bot. v. II. p.* 182., *and v. III. p.* 145.

Sea-shores, on the larger Algæ, perhaps common; but so continually confounded with other species, that it is impossible to say how many of the recorded stations belong to it. Our description is drawn up from Yarmouth specimens, communicated by *Dawson Turner, Esq.*, and compared by him with the *Ceramium roseum* of Roth. — 2—4 inches high, much branched from the base, excessively tufted, branches long and flexuose, patent, distichous or quadrifarious, plumulate, plumules towards the top crowded and fasciculate, 4—6 lines long, the lower pinnules long, simple and flexuose, setaceous, erecto-patent, the upper sparingly pinnulate about the apices. *Colour* a fine purple-red. *Main articulations* sub-

opaque, filled with jointed veins. *Capsules* elliptical, rather large, secund, 2—4 on the pinnæ towards the base. *Favellæ* ovate, large, dark-red, binate or clustered. *Articulations* in the stem and branches 4—5 times, in the branchlets 3—4, and in the pinnules 2—3 times, longer than broad. — Much confusion has been created respecting this species, by the discrepancy between the figures in *English Botany* and *Dillwyn's Confervæ*, though both plates are *stated* to have been taken from specimens, from *the same locality*, and each compared with the original plant of Roth. The *E. Bot.* figure is much the best of the two, though neither precisely agrees with our plants, or with any other species that I am acquainted with. Agardh asserts, but I do not see with what reason, that the plant described in the II. vol. *Roth Cat. Bot.* (which was that sent to Mr. Turner, and compared by him with the Yarmouth specimens), differs from the species published by Roth, under the same name, in his *III. vol.*; which latter Agardh holds to be the true *Ceramium roseum.*

11. C. *byssoides*, Arn. MS. (*byssoid Calithamnion*); filaments slender flaccid entangled, plumules flexuose and byssoid linear-lanceolate, lower pinnæ subsimple or bi-trifid, upper subcorymbose alternately multifid very erect, articulations of the branches 8, of the pinnæ 4—5 times longer than broad, capsules sessile solitary on the pinnæ (not in the axils).

Whitsand bay, *G. A. W. Arnott, Esq.* Devonshire, *Mrs. Griffiths.* — 2—3 inches long, much branched, entangled, and very slender, axils acute, plumules crowded in the upper part. *Colour* a fine rosy purple. *Capsules* elliptical, sessile or minutely pedicellate, solitary on the ultimate pinnules near the base. Habit very much that of *C. corymbosum*, but differing in the *alternate*, not *dichotomous*, branching of the plumules, and the position of the capsules.

12. C. *polyspérmum*, Ag. (*many-fruited Calithamnion*); slender membranaceous loosely branched, plumules lax linear-oblong pinnæ short patent acute spine-like, articulations of the branches 4—5 times, of the pinnæ twice, as long as broad, capsules lining the inner faces of the pinnæ.—*Ag. Sp. Alg. v.* 2. *p.* 169.—*Ceramium Felixii, Gaillon?*

Pier, Torquay, *Mrs. Griffiths.* Appin, *Captain Carmichael.* Mount Edgecombe, *Mr. Arnott.* — 1—3 inches high, somewhat naked or with short branches at the base, much and somewhat flabellately branched upwards; upper branches elongate, their lower half set with short spine-like ramuli, above alternately plumulate, plumules pinnate, pinnæ nearly of equal length throughout, simple, the upper ones in old specimens occasionally furnished with a new series of pinnæ. Colour dull rose-red. Articulations of the stem and main branches swollen at the joints, with a very narrow tube. *Capsules* profuse, sphærical. *Favellæ* large, roundish or ovate, binate. In drying, it scarcely adheres to paper. A very distinct and beautiful species, well marked by its narrow plumules and equal spine-like pinnæ.

13. C. *tétricum*, Ag. (*rope-like Calithamnion*); rigid, branches densely ramulose hairy below, plumulate above, plumules crowded quadrifarious oval simply pinnate, pinnæ acute basally attenuated erecto-patent, articulations 2—3 times longer than

broad, capsules elliptical minute on short lateral processes of the pinnæ.—*Ag. Sp. Alg. v.* 2. *p.* 179.—*Conferva tetrica, Dillw. Conf. t.* 81. *E. Bot. t.* 1915.

On rocks, generally such as are perpendicular; very common,—2—8 inches long, forming dense ropy tufts. In drying, it adheres, but not firmly, to paper; and on being again moistened, is extremely fragile, scarcely able to sustain its own weight. *Capsules* 1—3 on each lateral process. *Favellæ* generally in pairs, minute, seated on the plumules, and nearly terminal.

14. C. *tetragonum*, Ag. (*square-stalked Calithamnion*); stem subsimple cartilaginous, branches patent alternate once or twice pinnate, plumules short alternate spreading pinnate below, fasciculately multifid above, apices obtuse with a mucro, articulations of the ramuli once and a half as long as broad, joints contracted.—*Ag. Sp. Alg. v.* 2. *p.* 176.—*Conferva tetragona, Dillw. Conf. t.* 65. *E. Bot. t.* 1690.

On the larger *Laminariæ*, abundant on the southern coasts of England and south and west of Ireland.—*Capsules* excessively minute, sessile, elliptico-sphærical, secund on the upper ramuli. *Favellæ* solitary or in pairs, large.

15. C. *granulátum*, Ag. (*warted Calithamnion*); stem subsimple cartilaginous distichously branched, branches erecto-patent, plumules subquadrifarious erect pinnate below, multifid and level-topped above, pinnules subulate very erect and close-pressed, articulations of the ramuli twice as long as broad.—*Ag. Sp. Alg. v.* 2. *p.* 177.

On the larger *Algæ*, probably common. Appin, *Captain Carmichael.* Whitsand bay, *Mr. Arnott.*—*Stems* 2—4 inches high, elegantly tufted, thicker than hog's bristle at the base, alternately branched, their outline lanceolate. *Colour* a brownish-red. *Capsules* resembling those of *C. tetragonum*, from which the present species is chiefly distinguished by its more erect and level-topped (corymbose) plumules, subulate pinnules and rather longer joints. Our description is taken from Carmichael's specimens; Mr. Arnott's plant from Whitsand bay is smaller, more slender and flaccid.

16. C. *purpurascens*, Sm. (*purple Calithamnion*); purplish-red repeatedly branched very slender and tufted, joints slightly tumid thrice as long as broad with pellucid partitions, those of the main-stems compound, capsules lateral sessile. *Smith.*—*E. Bot. t.* 2465.

"Gathered on the beach at Brighton, by *Mr. W. Borrer*, who thinks it may be *C. purpurascens* of Hudson." *Sm.*—Of this plant I know nothing, nor am I aware of the existence of any authentic specimens. Mr. Borrer suspects it may only be a larger specimen of *C. rosea.* Agardh refers to the *E. Bot.* figure under his *C. versicolor;* but that species has dichotomous ramuli, and axillary capsules.

** *Plumules more or less obovate or flabellate.*

17. C. *fasciculatum*, Harv. MSS. (*tufted Calithamnion*); tufted, branches erect flexuose level-topped, plumules elongate erect

linear-obovate truncate, pinnæ long and flexuose, the lowermost simple appressed, the upper erecto-patent ramulose at the top, articulations of branches thrice, of pinnæ once or twice, as long as broad subtorulose.

Sea-shores, at Yarmouth, *Mr. Borrer.* — 2—3 inches high, nearly naked at the base, much branched and tufted upwards, bushy, very slender; the apices of the branches looking, to the naked eye, as if truncated, or corymbose; branches long and flexuose, very erect, their upper half closely plumulate, plumules long, appressed. *Colour* a fine purple-red. Articulations of the main-stem nearly opaque, composed of jointed fibres. *Capsules* rare, subsolitary, elliptical, at the base of the pinnæ.

18. C. *Borreri*, Ag. (*Borrer's Calithamnion*); filaments slender membranaceous loosely branched, plumules fanshaped naked below, pinnate above, pinnæ recurvo-patent simple, the lower ones the longest, articulations of the branches 4—5 times, of pinnæ twice or thrice, as long as broad, joints contracted. — *Ag. Sp. Alg. v.* 2. *p.* 170.—*Conferva Borreri, E. Bot. t.* 1741. *Dillw. Conf. Syn. p.* 79.

Yarmouth, *Mr. Borrer.* Two inches high, forming slender tufts, of a delicate pink colour, turning to orange in fresh water. Substance flaccid and delicately membranaceous. A very rare and little known plant. Our description is drawn up from an original specimen, communicated by *Dawson Turner, Esq.*

19. C. *seminúdum*, Ag. (*semi-denudated Calithamnion*); filaments much branched somewhat rigid, plumules fanshaped naked below, pinnate above, pinnæ long patent simple, the lower ones the longest, articulations of branches zig-zag 2—3 times as long, of pinnæ about as long as broad.—*Ag. Sp. Alg. v.* 2. *p.* 167. (*according to specimens from the author.*)

Pier, Torquay, *Mrs. Griffiths.* — 1—3 inches high, sparingly branched below, excessively branched in the upper part, branches flexuose, their upper half alternately plumulate; pinnæ simple, or with the upper half once again pinnated. *Colour* a fine dark-red, given out in fresh water. *Articulations* of the stem swollen at the joints. *Capsules* very rare, minute, sphærical, seated at the base of the older pinnæ. In drying, it adheres pretty strongly to paper. Nearly allied to *C. Borreri*, but distinguished by the above characters.

20. C. *affine*, Harv. MSS. (*allied Calithamnion*); much branched, secondary branches of a roundish outline long alternately plumulate, plumules very narrow linear-clavate simply pinnate, pinnæ short erect increasing in length upwards attenuate crowded at top, articulations of branches 3—4 times, of pinnæ once and a half, as long as broad.

Shores of Bute, on *Fuci, Dr. Greville.* — Excessively branched, 2—3 inches high, bushy, main filaments much divided, set with very numerous alternate secondary branches, of a roundish or ovate figure, alternately plumulate; plumules short, very narrow; lowermost pinnules distant, short and somewhat spine-like, uppermost elongated and crowded. Colour deep-red. Articulations of the stem 4 times as long as broad, closely filled with very slender longitudinal veins. *Capsules* either in the axils of the pinnæ or on the first joint. *Favellæ* large, subglobose.

— *Habit* most like a coarse specimen of *C. versicolor*, but in its microscopic characters nearer to *C. Borreri*, or *seminudum*.

21. C. *Grevíllii*, Harv. (*Greville's Calithamnion*); slender, sparingly and distichously branched, plumules linear-obovate round-topped, pinnæ erect, the lower ones short and spinelike, the upper long, branched at top, articulations of branches 2—3 times, of pinnules once and a half, as long as broad.—*C. roseum*, *Grev. Fl. Edin. p.* 311.—*C. purpurascens*, *Johnston Berwick Flora*, *v.* 1. *p.* 240?

On *Algæ*, near low-water mark, Firth of Forth, *Dr. Greville*. Berwick, *Dr. Johnston*. — 1—2 inches high, forming small tufts: branches long, their lower part furnished with short irregular ramuli, their upper half distichously plumulate; plumules long, narrow, obovate; upper pinnæ alternately or secundly branched at top. *Colour* a dull purplish-red. Articulations of the stem with a narrow tube, and swollen joints. *Capsules* subsolitary, sphærical. — On moistening this plant, after having been dried, it is very fragile, and in common with many other species, exhales an odour somewhat resembling that of violets.

*** *Plumules dense, lanceolate or narrow-oblong, bipinnate.*

22. C. *spinosum*, Harv. (*spiny Calithamnion*); stems subsimple obscurely articulated, plumules linear-oblong compact spreading round-topped, pinnæ short with several spine-like patent pinnulæ, articulations of stem veined 2—3 times, of pinnæ once and a half, as long as broad, capsules on the inner face of the pinnæ.

Sidmouth, *Mrs. Griffiths*. — *Root* scutate, hairy. *Stems* ½ to 1 inch high, subsimple, thickly and closely set with quadrifarious (in the lower part), or alternate (in the upper) plumules. *Plumules* linear-oblong; pinnæ very short, patent; pinnulæ mostly secund, divaricating and spine-like. *Colour* dull-red, brownish when dry. *Capsules* sessile, subsolitary on the inner face of the ramuli.

23. C. *gracillimum*, Ag. (*graceful Calithamnion*); filaments distichous decomposito-pinnate, upper plumules long narrow ovate or sublanceolate acute patent bi-tripinnate, articulations of stem cylindrical 3—4, of pinnæ 2—3 times, longer than broad, capsules terminal on the pinnules.—*Ag. Sp. Alg. v.* 2. *p.* 168.

Pier, Torquay, *Mrs. Griffiths*. — *Filaments* 1—4 inches high, irregularly branched, exceedingly slender, distichous; main branches few, unequally plumulate for their whole length; lower plumules short, vaguely pinnate, upper from half an inch to an inch long, narrow-ovate or lanceolate, acute, patent, bi-tripinnate; outline of principal branches broadly ovate. *Colour* rose-red. *Capsules* minute, elliptical, terminal, trisporous. *Favellæ* roundish, densely clustered. — One of the most beautiful and delicate of the Genus; perfectly distinct from the following, though it is not easy in a few words to express clearly their differences.

24. C. *tripinnátum*, Ag. (*triply-pinnate Calithamnion*); alternately branched, branches with an axillary tuft, plumules narrow-elliptical or lanceolate bipinnate, articulations of branches

flexuose with swollen joints, twice as long as broad, those of the pinnæ shorter.—*Ag. Sp. Alg. v.* 2. *p.* 168.

Plymouth, *Mr. Sconce.* Pier, Torquay, *Mrs. Griffiths.*—1—2 inches high; stem and branches flexuose, pinnæ and pinnulæ very slender, the larger plumules with an axillary tuft like the branches, articulations of the stem remarkably torulose at the joints. *Colour* rose-red.—Very closely allied to *C. thuyoides*, but differing in its shorter articulations, torulose joints, and the axillary tufts of the branches.

25. C. *thuyoides*, Ag. (*Arbor-vitæ Calithamnion*); very slender irregularly branched, plumules linear-lanceolate bipinnate, articulations of the branches 4—6, of the pinnæ 2—3 times longer than broad, capsules terminal.—*Ag. Sp. Alg. v.* 2. *p.* 172.—*Conferva thuyoides*, *E. Bot. t.* 2205.

Very rare: Yarmouth, *Mr. Borrer.* Plymouth, *Mr. Sconce.*—Very flaccid and slender, 1—3 inches high: plumules distant, alternate, 2—3 lines long; ramuli extremely slender. Colour a fine rose-red.

b. *Secondary or smaller branches alternately dichotomous. Capsules elliptical, solitary, axillary; favellæ mostly binate.*

26. C. *corymbosum*, Ag. (*corymbose Calithamnion*); capillary flaccid and gelatinous, secondary branches alternate excessively dichotomous level-topped, ultimate ones dichotomous acute appressed, articulations of branches 8—10, of the ramuli 5—6 times longer than broad.—*Ag. Sp. Alg. v.* 2. *p.* 165.—*Conferva corymbosa*, *E. Bot. t.* 2352. (*joints too short.*)

Rare; at Brighton, *Mr. Borrer.* Bantry, *Miss Hutchins.* Appin, *Capt. Carmichael.* Bute, *Dr. Greville.*—1—3 inches high, excessively delicate and tender, much branched, secondary branches byssoid. Colour a delicate rose-red. *Capsules* minute, elliptic-oblong, shortly pedicellate, solitary, very rarely binate, trisporous, axillary. *Favellæ* large, binate.—The figure in *E. Bot.* is not good, as it represents the joints too short. Our description is taken from Mr. Borrer's original specimens.

27. C. *versicolor*, Ag. (*changeable Calithamnion*); filaments setaceous at base, capillary above, flaccid and tender, penultimate branches alternate naked below, excessively dichotomous above, level-topped, ultimate dichotomies spreading, articulations of branches 4—6, of ramuli 2—3 times longer than broad.—*Ag. Sp. Alg. v.* 2. *p.* 170. (*according to specimens from the author*).

Coast of Devonshire, *Mrs. Griffiths.*—2—3 inches high, nearly as thick as hog's bristle at the base, excessively branched and capillary above; branches set with alternate, erecto-patent, obovate, secondary branches generally naked below, their upper half furnished with dichotomo-multifid alternate ramuli. Colour a beautiful rose-red. *Capsules* elliptical, subsessile, solitary on the ramuli, in the axils of the dichotomies or at one side. *Favellæ* large, binate. Nearly allied to *C. corymbosum*, but a larger and much coarser plant; the joints shorter, and the ultimate dichotomies closer and more patent.

28. C. *spongiósum*, Harv. (*spongy Calithamnion*); stems thick cartilaginous branched in every direction, penultimate branchlets dense quadrifarious repeatedly dichotomous round-topped, axils

patent, apices short bifid, articulations of the branches swollen at the joints thrice as long as broad.

Torquay, *Mrs. Griffiths.* Kingston Harbour and Killiney, near Dublin, *W. H. Harvey.*—2—4 inches high, flaccid and spongy; stems shrubby; branches long, patent, thickly clothed with short, secondary branchlets, about half an inch in length, which are again covered with a third set of branchlets, spreading on all sides, and giving the plant a shrubby character, much resembling *C. Arbuscula.* Main articulations veined. *Capsules* solitary, axillary, elliptical. *Favellæ* roundish or lobed.

29. C. *interrúptum*, Ag. (*interrupted Calithamnion*); "purplish much branched forked capillary, joints four times as long as broad, slightly swelling upwards, capsules on short lateral stalks elliptical with a transverse separation." *Sm.—Ag. Sp. Alg. v.* 2. *p.* 174.—*Conferva interrupta, E. Bot. t.* 1838.

At Brighton, *Mr. Borrer.* Weymouth, *Rev. M. J. Berkeley.*—This I believe to be nothing but a trifling variety of the following.

30. C. *pedicellátum*, Ag. (*stalk-fruited Calithamnion*); tufted, the branches long slender and little divided, beset with short alternate sparingly dichotomous secondary ramuli, apices obtuse scarcely tapered, articulations variable mostly very long, capsules solitary axillary pedicellate.—*Ag. Sp. Alg. v.* 2. *p.* 174.—*Conferva pedicellata, E. Bot. t.* 1817. *Dillw. Conf. t.* 108.

Rather rare: Brighton, *Mr. Borrer.* Devonshire, *Mrs. Griffiths.* Bantry, *Miss Hutchins.* Miltown Malbay, *W. H. Harvey.*—2—6 inches high, flaccid, as thick as horse-hair; branches long and little divided, springing near the base, beset with short dichotomous ramuli, which are often crowded at the apex so as to give the plant a penicillated appearance; apices always rounded and obtuse. Articulations extremely variable in length, 4—12 times longer than broad. *Colour* fine red, which is rapidly given out in fresh-water, and the plant fades in drying to a dull dingy-brown. *Capsules* elliptic-oblong or pyriform, dark, raised on short hyaline pedicells. Very variable in general appearance; but easily recognised under the microscope by its thick, scarcely tapered, very obtuse and sparingly dichotomous ramuli and its pedicellated dark-brown capsules. I have carefully compared authentic specimens of the *E. Bot.* plant, with individuals figured by Dillwyn, and am convinced of their specific identity.

C. *Branches irregular, ramuli alternate or secund, subsimple,* —(*small plants, rarely exceeding an inch in height*).

* *Forming broad, woolly tufts, on rocks or the larger Algæ.*

31. C. *Róthii*, Lyngb. (*Roth's Calithamnion*); filaments forming wide entangled tufts short erect dichotomous, branches long straight appressed.—*Lyngb. Hydroph. Dan. p.* 129. *t.* 41. *Ag. Sp. Alg. v.* 2. *p.* 185.—*Conferva Rothii, Turt.*—*Dillw. Conf. t.* 73. *E. Bot. t.* 1702.

Marine rocks, near high-water mark, common.—Filaments a quarter of an inch to an inch in height, forming large velvety patches, of a deep red or purple colour. *Capsules* (discovered by the acute and indefatigable *Capt. Carmichael*) elliptical, minute, borne in clusters on short, spreading, corymbose ramuli, situated near the apices of the branches.

32. C. *floridulum*, Ag. (*pale-red Calithamnion*); filaments short densely entangled sparingly branched, branches alternate or sub-dichotomous nearly simple appressed, articulations thrice as long as broad.—*Ag. Sp. Alg. v.* 2. *p.* 188.—*Conferva florida, Dillw. Conf. Supp. t. F.*

Rocks near low-water mark; Galway coast, *Dr. Scott.* Antrim, *Mr. J T. Mackay.*—This, I have little doubt, is only *C. Rothii*, altered by growing in deeper water.

33. C. *répens*, Lyngb. (*creeping Calithamnion*); filaments creeping, stems erect broadly tufted, branches alternate patent with a few short ramuli, articulations 3—6 times longer than broad, capsules sphærical on long simple or branched pedicels. *Lyngb. Hydroph. Dan. p.* 128. *t.* 40. *Ag. Sp. Alg. v.* 2. *p.* 184.—*Conferva repens, Dillw. Conf. t.* 18. *E. Bot. t.* 1608. (*the young plant*).—*Conf. tenella, Dillw. Conf. Supp. t. F.*

On the larger *Algæ*, especially *Furcellaria lumbricalis*, common.—*Tufts* 1—1½ inch high, deep-red, forming a dense woolly coating on the infested Algæ. *Capsules* sphærical, or long pedicells.

34. C. *mesocárpum*, Carm. (*medial-fruited Calithamnion*); "filaments minute cæspitose, branches virgate erect, articulations 4—5 times longer than broad, capsules elliptical on long pedicels." *Carm.*

Rocks at the extremity of low-water mark; Appin, *Capt. Carmichael.* Rare.—"Tufts contiguous, forming a broad shaggy purple crust. *Filaments* 2—3 lines long, sparingly branched; branches long, straight, erect, simple and subsecund. *Capsules* crowded about the middle of the filaments, secund or opposite, on long single-jointed or forked peduncles, the capsules, in the latter case, either in the axils or substituted for a branch of the fork. I could not discover that it sprung from creeping filaments." *Carm. MSS.*—This appears to come very near *C. strictum* of Agardh.

** *Minutely tufted, parasitical.*

35. C. *sparsum*, Harv. (*scattered Calithamnion*); filaments minutely tufted scattered sparingly branched, branches spreading unequal, articulations twice or thrice as long as broad, "capsules obovate sessile mostly axillary." (*Carm.*)—*C. floridulum, Lyngb. Hydroph. Dan. p.* 136?

On old stems of *Lam. saccharina*, at Appin, *Capt. Carmichael.* On *Conf. rupestris*, at Miltown Malbay, *W. H. Harvey.*—Scarcely a line high, forming minute scattered tufts. *Stems* nearly simple, erect, slightly branched beyond the middle, branches erecto-patent, alternate or secund, of unequal length, apices obtuse.—This is probably the *Cal. floridulum* of Lyngbye. It is better distinguished from *C. Rothii* by its minute size and scattered habit, than by any precise character. The fruit, however, is very different.

36. C. *Daviésii*, Ag. (*Davies' Calithamnion*); rose-red minute tufted much branched, branches flexuose scattered distant erecto-patent with a few erect ramuli, apices acuminate, articulations 3—5 times longer than broad.—*Conferva Daviesii, Dillw. Conf. Syn. p.* 73. *t. F.*—*E. Bot. t.* 2329.

On marine *Algæ*, Anglesea, *Rev. H. Davies.* Bantry, *Miss Hutchins.* Brighton, *Mr. Borrer.* — 2—4 lines high, elegantly tufted, much but distantly branched; ramuli few, scattered; articulations slightly contracted at the joints.

37. C. *virgátulum*, Harv. (*minute virgate Calithamnion*); rose red minute penicillately tufted, branches very straight close long virgate erecto-patent alternate, ramuli from every joint alternate or secund short obtuse, articulations thrice as long as broad.

On *Ceramium rubrum;* Devonshire, *Mrs. Griffiths.* — 2—3 lines high, forming small pencil-like tufts, erect, very straight; the lower part nearly simple and naked, the upper closely set with long alternately pinnate or fasciculate branches, beset at each joint with minute, gemmæform, 1—2-jointed ramuli. *Articulations* coloured. *Capsules* minute, elliptical, solitary or clustered. Habit something like that of *C. Daviesii*, but I trust sufficiently distinguished by the above character.

38. C. *secundátum*, Ag. (*secund Calithamnion*); rose-red very minute tufted flexuose sparingly branched, ramuli short secund close spreading obtuse, articulations 4 times longer than broad. —*Ag. Sp. Alg. v.* 2. *p.* 187.—*C. Daviesii, β. secundatum, Lyngb. Hydroph. Dan. t.* 41.

On the larger *Algæ*, probably common. On *Zostera*, Appin, *Capt. Carmichael.* On *Porphyra laciniata* and *Alaria esculenta*, at Miltown Malbay, *W. H. Harvey.*—A line or less in height, forming minute tufts, or spreading in continuous velvety patches. *Capsules* solitary or tufted, terminal on abbreviated ramuli, sessile, elliptical, dark-brown. Lyngbye's figure entirely agrees with our plant, except in the length of the articulations.

39. C. *lanuginósum*, Lyngb. (*downy Calithamnion*); nearly simple exceedingly minute brownish, ramuli short obtuse secund, articulations thrice as long as broad pellucid in the centre. — *Lyngb. Hydroph. Dan. p.* 130. *t.* 41.—*Conferva lanuginosa, Dillw. Conf. t.* 45.—*Calithamnion pubescens, Ag. Sp. Alg. v.* 2. *p.* 187.

Very common on decaying *Algæ*, especially *Ceramium rubrum.*—This is the most minute and simple of the genus.

TRIBE XVI. CONFERVEÆ. *Plants green, very rarely pink or brown. Fructification* (*except in* Bulbochæte) *a granular coloured internal mass* (*called* endochrome) *which affects various forms.—Fresh-water or marine.*

65. BULBOCHÆTE. *Ag.* Bulbochæte.

Filaments articulated, branched; each articulation bearing, at its truncated apex, either an elongated, inarticulate, deciduous seta, or a sessile sphærical *capsule;* base of the seta scutate, amplexicaul.—Name;—βολβος, a *bulb*, and χαιτη, a *bristle;* in allusion to the setaceous ramuli with swollen bases.

1. B. *setigera*, Ag. (*setigerous Bulbochæte*). *Ag. Syst. Alg. p.* 123.—*Conferva setigera, Roth. Cat. Bot. v.* 3. *t.* 8. *f.* 1.—

Conferva vivipara, Dillw. Conf. t. 59.—*a.* branches erect.—*β.* branches reflexed secund.

On fresh-water plants, in lakes, bogs, &c.—*β.* on *Chara aspera*, at Holyhead, *W. Wilson, Esq.*—Filaments $\frac{1}{4}$—$\frac{1}{2}$ inch long, forming a densely woolly covering on the affected plant. *Colour* a pale dull-green.

66. Conférva.[1] *Ag.* Conferva.

Filaments articulated, free, distinct, uniform, simple or branched. *Fruit* (?) an internal coloured granular mass, (*endochrome*). *Colour* green, rarely purple or orange.—Name derived from *conferruminare*, to *consolidate;* some of the species being considered by the ancients useful in the healing of fractured limbs.

A. *Filaments simple.*

a. *Filaments decumbent, arachnoid, forming strata, of a purple colour.—Alpine bogs.*

1. C. *ericetórum*, Roth, (*Moor Conferva*); filaments very slender simple forming a thin dull purple stratum, articulations a little longer than broad, endochrome dark-coloured filling the tube finally bipartite unaltered in drying.—*Dillw. Conf. t.* 1. *E. Bot. t.* 1553. *Grev. Crypt. Fl. t.* 261?

On dry heaths, abundant: occasionally in water.

2. C. *purpurascens*, Carm. (*purple Conferva*); filaments very slender simple forming a cloudy floating purple stratum, articulations once or twice as long as broad, endochrome collapsed pale rarely filling the tube.—*C. ericetorum, β. aquatica, Ag. Syst. Alg. p.* 87. (*in part?*)

In old turf-pits, and boggy pools, common.—"At first occurring as a dusky-green cloud, diffused throughout the water, gradually changing to a pretty bright purple, and rising in a bullated stratum to the surface. Granular mass collapsed into a great variety of forms, generally attached to one side of the tube. It adheres firmly to paper. With *C. ericetorum* it has no affinity, except in colour." *Carm. MSS.*

3. C. *alpina*, Bory, (*alpine Conferva*); filaments simple very slender purple, articulations 4 times as long as broad, endochrome collapsed rarely filling the tube.—*Lyngb. Hydroph. Dan. t.* 47. *Grev. Crypt. Fl. t.* 261. *f.* 2.

Subalpine rivulets: abundant in the Highlands of Scotland, *Dr. Greville.*

b. *Filaments elongated, floating, rarely attached, flaccid, forming green strata.—Fresh-water.*

4. C. *bombycina*, Ag. (*silky Conferva*); filaments excessively fine forming a cloudy floating yellow-green stratum, articulations 3—5 times longer than broad.—*Ag. Syst. Alg. p.* 88.—*C. sordida, Dillw. Conf. t.* 60.

In stagnant waters, about the stems of aquatic plants, common.

[1] Though fully sensible of the heterogeneous character of this genus, I prefer retaining it as established by Agardh, until the *structure* of the species be better understood.

5. C. *floccósa*, Ag. (*floccose Conferva*); filaments very slender forming pale-green floating strata, articulations once or twice as long as broad.—*Ag. Syst. Alg. p.* 89.—*C. fugacissima, Dillw. Conf. Suppl. t. B.*

In ditches and pools; very nearly allied to *C. bombycina*, but "much more robust, fine as it is; besides the great disparity of the articulations." *Grev.* I have frequently found the two growing together.

6. C. *zonáta*, Webr. et Mohr, Ag. (*banded Conferva*); filaments unequal forming bright-green lubricous masses, articulations rather longer than broad marked in the centre with a full-green band.—*Ag. Syst. Alg. p.* 90. *Dillw. Conf. Syn. p.* 41. *and C. lubrica, t.* 47.

On stones, in rivulets.

7. C. *vesicáta*, Ag. (*inflated Conferva*); filaments very slender forming dull-green strata, articulations variable in length 2—5 times longer than broad, here and there inflated.—*C. vesicata, tumidula, Candollii and Borisii, Ag. Syst. Alg. pp.* 93—94.—*C. alternata, Dillw. Conf. Syn. t. B.*—*C. tumidula, E. Bot. t.* 1670.

In stagnant water, common.—In uniting the above four species of Agardh, I gladly follow *Capt. Carmichael*, who remarks, that "in a genus so notoriously variable in the length of the articulations, the differences indicated in the definitions will hardly entitle them to rank even as varieties."

8. C. *rivuláris*, Linn. (*River Conferva*); filaments slender very long straight bright-green silky forming tufted bundles, articulations 2—4 times longer than broad.—*Ag. Syst. Alg. p.* 95. *E. Bot. t.* 1654. *Dillw. Conf. t.* 39.

In streams and rivers, common.—2—3 feet long, tufted. I have never seen the joints so short as represented by Dillwyn; but his figure is, in other respects, characteristic.

9. C. *mucósa*, Mert. (*mucous Conferva*); filaments forming a floating bright-green stratum extremely gelatinous invested with definite mucus, articulations about as long as broad.—*Dillw. Conf. Syn. t. B.* (*bad.*) *Ag. Syst. Alg. p.* 90.

In stagnant water, rare. Bantry, *Miss Hutchins*. Appin, *Capt. Carmichael*.—"*Filaments* about the thickness of those of *C. dissiliens* cylindrical, by no means fragile, surrounded by a mucous envelope, twice their own diameter. *Articulations* about as broad as long. *Sporular mass* sometimes filling the whole joint, sometimes about two-thirds. In the latter case, the contrast between the opaque and transparent parts of the joint, gives the filament a remarkably beautiful appearance. In drying, it discharges a profusion of large granules, and becomes slightly contracted at the joints; but without any sensible reduction of its diameter." *Carm. MSS.*

10. C. *dissiliens*, Dillw. (*fragile Conferva*); filaments elongated straight very fragile slimy and gelatinous forming bright-green floating masses, articulations half as long as broad.—*Dillw. Conf. t.* 63. (*not of E. Bot.*) *Ag. Syst. Alg. p.* 90.

In streams and ditches, not uncommon. — Articulations marked by a green band, often separating and adhering at the angles.

11. C. *capilláris*, Linn. (*capillary Conferva*); filaments pale-green void of lubricity much curled and interwoven into sub-rigid extensive strata, articulations 3—4 times longer than broad.—*C. crispa, Dillw. Syn. Conf. p.* 46. *t. B.—Prolifera crispa, Vaucher.—Conferva capillaris, E. Bot. t.* 2364.

In streams and rivulets, in many places; forming extensive strata, many feet in diameter. In drying, the articulations are often, but not invariably, alternately compressed. It does not adhere to paper.

c. *Filaments forming crisped, entangled strata, green—growing in the sea or in salt-water ditches.*

12. C. *Linum*, Roth, (*flax-like Conferva*); filaments thick rigid crisped forming loose extensive bundles of a dull-green colour, articulations once and a half as long as broad.—*Ag. Syst. Alg. p.* 97. (*according to specimens from that author.*)

In salt-water ditches, along the muddy sea-shore.—"Forming distinct, loosely interwoven, subcylindrical tufts, of a yellowish-green colour, which, in a more advanced state, changes to a dark olive: attached at one end and resting on the bottom of the pool. *Filaments* as thick as those of *C. ærea*, rigid, brittle and variously curved. *Articulations* filled with green matter, intermixed with large granules, irregularly contracted and compressed in drying." *Carm. MSS.*

13. C. *crassa*, Ag. (*thick Conferva*); filaments very thick of great length deep glossy-green much crisped rigid forming loosely entangled harsh masses, articulations as long as broad. —*Ag. Syst. Alg. p.* 99.—*C. capillaris, Dillw. Conf. t.* 9.

In salt-water ditches, near the coast, in many places: very abundant in the ditches by the North Wall, Dublin, *W. H. Harvey.*—Filaments many feet long, twice as thick as hog's bristles, remarkably rigid and fragile when recent; but soon becoming flaccid on exposure to the air.

14. C. *tortuósa*, Dillw. (*twisted Conferva*); filaments rigid slender much curled and twisted forming broad closely entangled strata, articulations 2—3 times longer than broad.—*Dillw. Conf. t.* 46. *Ag. Syst. Alg. p.* 98.

In salt-water pools, and on marine rocks; abundant.

15. C. *impléxa*, Dillw. (*interwoven Conferva*); filaments very slender capillary rather flaccid forming extensive much entangled bright-green strata, articulations rather longer than broad.—*Dillw. Conf. Syn. p.* 46. *t. B. Ag. Syst. Alg. p.* 91. —*Intricata, Grev. Crypt. Edin. p.* 315.—*Bangia Johnstoni, Grev. in Johnst. Berw. Fl. p.* 260. (*according to original specimens.*)

On marine rocks. Bantry, *Miss Hutchins.* Berwick, *Dr. Johnston.* Firth of Forth, *Dr. Greville.*— *Filaments* half the diameter of *C. tortuosa*, with shorter joints. I can find no characters to distinguish the *C. intricata* of the *Flora Edinensis;* nor is *Bangia Johnstoni* in any way different (as Mr. Arnott first pointed out to me) from *C. implexa.*

16. C. *ulothrix*, Lyngb. (*short-jointed curled Conferva*); "filaments slender flexuose entangled somewhat rigid, articulations rather shorter than broad." *Lyngb. Hydroph. Dan. t.* 50. *Ag. Syst. Alg. p.* 98.

In rocky pools, attached to small Algæ. Appin, *Captain Carmichael.* —"*Filaments* slender, curled and convoluted into a small elastic green tuft. *Articulations* hardly so long as broad. It is the preceding species in miniature, with the exceptions above stated." *Carm. MSS.*

17. C. *perreptans*, Carm. (*creeping Conferva*); filaments slender crisped entangled into dull-green strata, bent at acute angles and at the genuflexion sending out attenuated creeping radicles, articulations about twice as long as broad.—*Zygnema littoreum, Lyngb. Hydroph. Dan. t.* 59.

On rocks, at the extreme verge of high-water mark. Appin, *Captain Carmichael.* Milton Malbay, *W. H. Harvey.*— Strata thin, dull-green: *filaments* irregularly twisted, forming very acute angles, here and there sending out tubular, indistinctly jointed, *partially* hyaline radicles, "which adhere to particles of sand and other matters within their reach; often to a neighbouring filament." *Carm.* In drying, the *endochrome* becomes contracted into a dark central cord.

18. C. *arenósa*, Carm. (*Strand Conferva*); filaments slender rigid interwoven into broad strata, articulations 3—5 times longer than broad.

"On the flat, sandy shore, about half-tide level, at Appin," *Captain Carmichael.*—"This species occurs in fleeces, a yard or more in extent, and of a peculiar structure. They consist of several exceedingly thin layers, placed over each other; but so slightly connected that they may be separated like folds of gauze, to the extent of many inches, without the least laceration. *Filaments* 5—6 inches long, about the thickness of *C. bombycina*, rigid, possessed of a peculiar roughness; feeling when pulled asunder, as if a hair were drawn over a piece of rosin. *Articulations* 3—5 times as long as broad; sporular mass assuming a great variety of forms. When old, the filaments become exceedingly rough and often tubercular. *Carm. MSS.*

d. *Filaments tufted, with a scutate root, straight, green;— inhabiting the sea.*

19. C. *Melagónium*, Web. et Mohr. (*wiry Conferva*); filaments elongate scattered straight thick erect stiff and wiry dark-green, articulations twice as long as broad.—*Dillw. Conf. Syn. p.* 48. *t. B. Ag. Syst. Alg. p.* 99.

In the sea, in many places; but not very common any where.—*Filaments* 5—8 inches high, remarkably rigid and wiry; dissepiments somewhat contracted, very narrow, but pellucid.

20. C. *æ'rea*, Dillw. (*harsh verdigris Conferva*); filaments elongated tufted straight harsh brittle yellow-green, articulations as long as broad.—*Dillw. Conf. t.* 80. *E. Bot. t.* 1929. *Ag. Syst. Alg. p.* 100.

In the sea, on sand-covered rocks, common in many places.— *Filaments* 3—12 inches long, tufted, as thick as hog's bristle, harsh to the

touch, of a beautiful yellow-green colour, fading in the herbarium to a dirty white. *Endochrome* finally bipartite. The articulations are visible to the naked eye.

21. C. *collábens*, Ag. (*flaccid verdigris Conferva*); filaments elongated straight tufted very thick gelatinous and flaccid, of a splendid æruginose green, articulations once and a half as long as broad.—*Ag. Syst. Alg. p.* 102.—*C. ærea, β. lubrica, Dillw. Conf. Syn. p.* 48.

At Yarmouth, on a floating piece of deal, *Dr. Hooker.*— *Filaments* 3—4 inches long, twice as thick as in *C. ærea*, of a splendid æruginose green colour, which is fully preserved in drying, very gelatinous, adhering most closely to paper; dissepiments much contracted. A highly beautiful plant; very distinct in my opinion from *C. ærea*, with which Dillwyn has confounded it.

22. C. *Youngána*, Dillw. (*Mr. Young's Conferva*); filaments short tufted straight bright-green somewhat rigid, articulations once or twice as long as broad, dissepiments finally contracted. —*Dillw. Conf. t.* 102. *Ag. Syst. Alg. p.* 101.—*C. isogona, E. Bot. t.* 1930.

On rocks, &c., near high-water mark; first discovered by *Mr. W. W. Young*, on rocks near Dunraven Castle, Glamorgan.— *Filaments* an inch long, forming small tufts, somewhat rigid (as compared with *C. collabens*), obtuse. *Articulations* variable.

23. C. *flácca*, Dillw. (*small flaccid Conferva*); filaments short tufted straight bright-green flaccid, articulations half as long as broad.—*Dillw. Conf. t.* 49. *E. Bot. t.* 1943. *Ag. Syst. Alg. p.* 102.

On Fuci, or floating timber.— *Filaments* half an inch to an inch long; forming broad, bright-green tufts. It adheres closely to paper.

e. *Filaments rising from disciform tubercles and forming pencil-like tufts, olivaceous, marine, parasitical.*

24. C. *fucícola*, Velley, (*large parasitic Conferva*); filaments rising from a minute tubercle penicillate flaccid membranaceous, articulations about twice as long as broad.— *Velley, Alg. t.* 4. *Dillw. Conf. t.* 66. *Lyngb. Hydroph. Dan. t.* 50.— *C. ferruginea, Roth.—Ag. Syst. Alg. p.* 103.—*C. fucicola, Ag. Syst. Alg. p.* 103.

On Fuci, especially *F. nodosus* and *vesiculosus;* common.—" *Filaments* branched at the base, within the tubercle. *Tubercles* variable in size; in tufts of the first year hardly perceptible,—from this period they increase by degrees, until at length they become globular, with a slender neck, and then drop off. In autumn, many of the tufts assume a yellowish or ochry colour, the effect of age and long exposure to the sun, and in this state they constitute the *C. fucicola* of Agardh." *Carm.*

25. C. *fláccida*, Dillw. (*flaccid rusty Conferva*); tubercles small, filaments penicillate flaccid and tender, lower articulations half as long as broad, upper of equal length and breadth. —*Dillw. Conf. Syn. t. G. Lyngb. Hydroph. Dan. t.* 50? *Ag. Syst. Alg. p.* 102?

On Fuci; especially *Cystoseira fibrosa.*—*Filaments* half an inch long, dull olive-brown; tubercle of the same structure as in *C. fucicola;* from which species, except in the shorter and more flaccid filaments and short joints, the present does not differ; *C. curta* being intermediate in these respects.

26. C. *cúrta,* Dillw. (*small parasitic Conferva*); filaments minute rising from a tubercle rather rigid sub-penicillate, articulations about as long as broad.—*Dillw. Conf. t.* 76. *Ag. Syst. Alg. p.* 103.

On Fuci.—*Filaments* 1—3 lines long, rising from a small tubercle, formed of denser, branching filaments, brown, tapering towards the base, obtuse. Articulations about as long as broad, dissepiments contracted.

27. C. *scutuláta,* Sm. (*target Conferva*); "olive-brown, filaments branched at the base densely combined into a depressed peltate mass rooted in the centre, joints as broad as long." *Sm.—E. Bot. t.* 2311.

On *Himanthalia lorea:*—on which it forms broad, wart-like tubercles.

f. *Filaments purple or pink, tufted.*

28. C. *cárnea,* Dillw. (*pale-red Conferva*); "filaments simple slender short pale-red, articulations torulose 2—3 times longer than broad, endochrome contracted into a solitary globule." *Dillw. Conf. t.* 84. *Ag. Syst. Alg. p.* 103.

On *Confervæ,* in the river near Lough, or Glamorgan, near its confluence with the sea, *Mr. W. W. Young.*

29. C. *ceramícola,* Lyngb. (*short-jointed rosy Conferva*); filaments very slender flaccid rosy, articulations equal in length and breadth, endochrome at length globular and escaping through the tube.—*Lyngb. Hydroph. Dan. t.* 48?

In rocky pools, on various small *Algæ,* at Appin, *Capt. Carmichael.*—"Filaments very slightly tufted, or rather gregarious, about an inch long, very slender and flaccid, of a purplish-rose colour. Articulations about as long as broad, becoming at length gibbous, when the internal mass, which was at first square, assumes a globular form, and bursts through the tube." *Carm. MSS.* The bursting of the tube and the discharge of the endochrome in globular masses, seem to indicate some affinity to the *Oscillatorieæ.*

B. *Filaments branched.*

a. *Inhabiting fresh-water or on damp ground.* (C. glomerata *sometimes grows in the sea.*)

30. C. *Brównii,* Dillw. (*Brown's Conferva*); "filaments branched erect densely tufted somewhat rigid short green, branches subsecund, articulations incrassated upwards about five times as long as broad."—*Dillw. Conf. Syn. t. D. Ag. Syst. Alg. p.* 105.

"On wet rocks, in a cave near Dunrea, Ireland, *R. Brown, Esq., Dillw.*

31. C. *nígricans,* Roth, (*blackish Conferva*); "filaments dichotomous somewhat rigid blackish-green, branches long remote

patent, articulations four times as long as broad." *Dillw. Conf. Syn. t. E.*—*C. aspera, Ag. Syst. Alg. p.* 115?

In a pond at Wimbledon, Surrey, *Mr. Dickson.*—A very obscure plant, of which I know nothing.

32. C. *crispáta*, Roth, (*branching cross-jointed Conferva*); "green branched crisped and entangled, branches alternate copious acute, joints even several times longer than broad alternately contracted when dry." *Sm. E. Bot. t.* 2350. *Dillw. Conf. t.* 93. *Ag. Syst. Alg. p.* 109.

"Collected in pools in Sussex, by *Mr. Borrer.*" *Sm.*—I am not able to distinguish this from *C. fracta*, the chief differences appearing to lie in the length of the joints; but this surely is most variable.

33. C. *flavéscens*, Roth, (*yellowish branched Conferva*); forming pale-yellowish strata, filaments slender sparingly branched, branches alternate or subdichotomous erecto-patent with scattered elongated alternate or secund ramuli, articulations 8—9 times longer than broad.—*Dillw. Conf. Syn. t. E.*—*Ag. Syst. Alg. p.* 112. *E. Bot. t.* 2088.—*C. pinnatula, Fl. Dan. t.* 945. (*sec. Roth.*) *Dillw. Conf. t.* 95.

In ditches of salt or fresh-water, not uncommon; forming vast strata, which finally rise to the surface.—Allied to *C. fracta;* but the filaments are more slender, with longer joints and of a pale yellow colour. It does not in the least adhere to paper.

34. C. *frácta*, Fl. Dan. (*broken divaricated Conferva*); forming entangled dull-green strata, filaments somewhat rigid much branched, branches divaricating, ramuli scattered and very patent, articulations 4—6 times longer than broad.—*Dillw. Conf. t.* 14. *E. Bot. t.* 2338. *Lyngb. Hydroph. Dan. t.* 52. *Ag. Syst. Alg. p.* 109.—*C. vagabunda, Linn.*—*Huds.* β. *flexuosa.*—*C. flexuosa, Dillw. Conf. t.* 10. *E. Bot.* 1944.

In ditches, &c., common.—β. in salt-water ditches, near Yarmouth, *D. Turner, Esq.*—Forming vast strata finally rising to the surface. *Filaments* much and very irregularly branched, all the branches very patent. β. differs in being less branched, remarkably flexuose, the ramuli elongated and secund, and the joints somewhat shorter; but there are intermediate appearances, and Dillwyn himself confesses that it is not always easy to distinguish between the two.

35. C. *glomeráta*, Linn. (*green clustered Conferva*); root scutate, filaments tufted bushy subrigid bright-green, branches crowded irregular erect, ultimate ramuli secund subfasciculate, articulations 4—8 times longer than broad.—*Dillw. Conf. t.* 13. *E. Bot. t.* 2192. *Ag. Syst. Alg. p.* 107.—β. *marina, Ag.*—*C. lætevirens, Dillw. Conf. t.* 48. *E. Bot. t.* 1854.

In streams and rivulets.—β. in the sea: both varieties very common.—This forms beautiful bushy tufts. A polymorphous plant; but sufficiently marked by the ultimate fasciculato-secund ramuli.

36. C. *ægagrópila*, Linn. (*Globe Conferva, or Moor Balls*); filaments issuing from a central point forming dense roundish balls, branches erect subsecund straight, articulations 3—4 times

longer than broad, the uppermost cylindrical, the lower swollen upwards.—*E. Bot. t.* 1377. *Dillw. Conf. t.* 87.

In lakes rare. North Wales, *Rev. H. Davies.* North of Scotland, *Mr. Brodie.* Prestwick Car, *Mr. Winch.* Culmere pool and Whitemere, Shropshire, *Rev. Mr. Williams.* Cunnemara, Ireland, *Mr. J. T. Mackay.* —This extraordinary production varies in diameter, from half an inch to 2—4 inches, forming a compact green ball, which is said in *E. Bot.* to be sometimes used for wiping pens upon. The name is derived from its resemblance to the balls that are found in the stomach of goats. The other Scottish station, (Mugdoch Lake,) given in the *Flora Scotica*, is incorrect, and belongs to *C. fracta.*

b. *Inhabiting the sea.*

37. C. *pellúcida*, Hudson, (*pellucid three-branched Conferva*); filaments cartilaginous rigid erect bright pellucid-green trichotomous, axils acute, articulations many times longer than broad. —*Dillw. Conf. t.* 90. *E. Bot. t.* 1716. (*excellent.*) *Ag. Syst. Alg. p.* 120.

Rocks near low-water mark, rare. Yarmouth, *Dr. Hooker.* Plymouth, *Mr. Sconce.* Miltown Malbay, *W. H. Harvey.* — Root an expanded disk, formed of tough fibres; stems subsolitary, rising, about an inch, undivided, afterwards much branched, very tough and wiry; branches and ramuli pretty regularly trichotomous.

38. C. *Hutchínsiæ*, Dillw. (*Miss Hutchins' Conferva*); filaments cartilaginous rigid glaucous-green flexuose tufted bristly, ramuli curved simple or furnished on the interior face with processes of one articulation, articulations twice as long as broad. —*Dillw. Conf. t.* 109. *Ag. Syst. Alg. p.* 120.

Very rare. Bantry bay, not uncommon, *Miss Hutchins.* Tor Abbey, *Mrs. Griffiths.*— *Filaments* thicker than horse-hair, deep glaucous-green, "with changeable tints when fresh, and under the water appearing almost white," flexuose, 5—8 inches long, much branched. Mrs. Griffiths sends us an extraordinary *variety* of this species from Torquay, with the branches much divaricated and almost bare of ramuli.

39. 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. Hutchinsiæ*, from which it is easily distinguished by the opposite ramuli and divaricated entangled branches.

40. C. *rupéstris*, Linn. (*green Rock Conferva*); filaments membranaceous rigid dark-green straight tufted bushy, branches erect crowded, ramuli fascicled appressed, articulations 3—4 times longer than broad.—*Dillw. Conf. t.* 23. *E. Bot. t.* 1699. *Ag. Syst. Alg. p.* 117.

On marine rocks, very common.

41. C. *diffúsa*, Roth, (*diffuse green Conferva*); filaments membranaceous rigid dark-green flexuose subdichotomous, branches distant elongated furnished towards the top with a few short patent secund ramuli, articulations 3—4 times longer than broad.—*Dillw. Conf. t.* 21. *E. Bot. t.* 2289. *Ag. Syst. Alg. p.* 116.—*C. distans, Ag. Syst. Alg. p.* 120.

Marine rocks; Swansea, *Dillwyn*. Devonshire, *Mrs. Griffiths*. Miltown Malbay, *W. H. Harvey*.—Nearly allied to *C. rupestris*, but differing in habit. Agardh founds a species on the British *C. diffusa*, which he calls *C. distans;* and states it to be nearly allied to *C. pellucida*. Our plant, which we are convinced is that of Mertens and Roth, is very nearly allied to *C. rupestris*, but not at all to *C. pellucida*.

42. C. *álbida*, Huds. (*whitish cottony Conferva*); filaments very slender capillary flaccid pale yellow-green forming dense silky tufts, branches crowded irregular, the uppermost ones patent and mostly opposite, ramuli opposite or secund, articulations 4—5 times longer than broad.—*Dillw. Conf. Syn. p.* 66. *t. E.—E. Bot. t.* 2327.—*C. heterochloa, Ag. Syst. Alg. p.* 115.—*C. refracta, Ag. Syst. Alg. p.* 114. (*reference to E. B.*)—*β. protensa;* elongated, ramuli straight patent irregular. *Dillw. Conf.*

On other *Algæ;* perhaps common. Cromer, *Mr. Turner*. Bantry, *Miss Hutchins*. Brighton, *Mr. Borrer*. Torbay, *Mrs. Griffiths*.—Filaments very slender, excessively branched and tufted, pale-green, quickly fading to a dirty white, lesser branches opposite. Habit very nearly that of an *Ectocarpus*.

43. C. *lanósa*, Roth, (*woolly green Conferva*); filaments slender short yellow-green forming dense tufts, branches virgate erect subdistant straight alternate or opposite, with a few alternate or secund ramuli, axils very acute, lower articulations twice, upper six times as long as broad.—*Dillw. Conf. Syn. t. E.—E. Bot. t.* 2099. *Ag. Syst. Alg. p.* 112.

On rocks and the larger *Algæ;* not uncommon.—*Filaments* forming entangled woolly tufts, an inch long, pale-green, stoloniferous below, branches straight and erect, all the axils very acute. It adheres to paper in drying, and in that state is usually of a dull whitish-green, without gloss:—nearly allied to *C. arcta*.

44. C. *centrális*, Lyngb. (*radiating green Conferva*); filaments elongated forming broad somewhat starry tufts of a full-green colour much branched, branches straight crowded erect, ramuli sub-appressed opposite or alternate, articulations twice as long as broad.—*Lyngb. Hydroph. Dan. p.* 161. *t.* 56. *Fl. Dan.*

Rocks on the verge of high-water mark. Bathing Cove, Torquay, *Mrs. Griffiths*.—Tufts flat, round, radiating from the centre: *filaments* 2—6 inches long, slender, much branched, and somewhat interwoven, stoloniferous, of a bright-green colour, which is but partially preserved in drying; joints pretty regularly twice as long as broad throughout the filament. The figure in *Fl. Dan.* is strikingly characteristic of our specimens, especially the magnified portion; that in Lyngbye's work is not so good.

45. C. *árcta*, Dillw. (*close green Conferva*); filaments elongated forming silky tufts of a full æruginose-green colour much branched, branches erecto-patent crowded, ramuli erect appressed opposite or alternate, lower articulations as long, upper much longer than broad.—*Dillw. Conf. t. E.*—*E. Bot. t.* 2098. *Ag. Syst. Alg. p.* 118.—*C. Vaucheriæformis, Ag. Syst. Alg. p.* 118.

On various other *Algæ*. Bantry, *Miss Hutchins*. Appin, *Captain Carmichael*.—*Filaments* 3—6 inches long, forming fine tufts, very glossy, much branched, stoloniferous. The joints are subject to much variation in length; and I have sometimes feared that the two preceding species, as well as *C. æruginosa*, are merely varieties of the present.—They are all equally remarkable for a bright glossy-green colour, a flaccid texture and a propensity to cast out, from their lower part, long, flexuose, creeping fibres or *stolones*.

46. C. *æruginósa*, Huds. (*branching Verdigris Conferva*); "filaments branched flexuose short æruginose, branches scattered patent obtuse, articulations rather longer than broad."—*Dillw. Conf. Syn. t. E.*—*C. marina*; capillacea, brevis, viridissima, mollis, *Dill. Hist. Musc. t.* 4. *f.* 20.

On Fuci; *Dillenius*, who alone appears to have met with it.

47. C. *ripária*, Roth, (*entangled shore Conferva*); filaments elongated slender decumbent pale-green forming wide strata, flaccid entangled angulato-flexuose slightly branched, lower branches short tentacular, upper long subsimple with rounded axils, articulations 2—4 times longer than broad.—*Dillw. Conf. Syn. t. E.*—*E. Bot. t.* 2100. *Ag. Syst. Alg.* 106.—*C. obtusangula, Lyngb. Hydroph. Dan. t.* 55.

On sand-covered rocks, near high-water mark. Bantry, *Miss Hutchins*. Appin. *Captain Carmichael*. Sunderland, *Mr. W. Backhouse*. Yarmouth, *Dillwyn*.—Lower branches short, spuriously articulated, and evidently of the same nature as the tentacular roots of our *C. perreptans*: upper ones very few, long, with rounded axils.

67. Hydrodíctyon. *Roth.* Water-net.

Filaments forming a network, with regular polygonal meshes, *articulations* viviparous.—Name; ὑδωρ, *water*, and δικτυον, a *network*.

1. H. *utriculátum*, Roth, (*common Water-net*); meshes pentagonal.—*H. pentagonum, Vauch.*—*Conferva reticulata, E. Bot. t.* 1687. *Dillw. Conf. t.* 97.

Rare. Ditches and pools in the middle and southern parts of England; not found in Scotland or Ireland.—This forms a beautiful tubular net, floating freely in the water. The meshes are pentagonal or hexagonal, varying in diameter from half a line to half an inch, and the filaments from the width of a human hair to that of the coarsest hog's bristle.

68. Mougeótia. *Ag.* Mougeotia.

Filaments articulated, simple, finally united by transverse tubes. *Endochrome* granular, at length forming roundish globules at the

point of conjugation. — Named in honour of *M. J. B. Mougeot.* an excellent German botanist, and one of the authors of the useful "*Stirpes Cryptogamæ Vosego-Rhenanæ.*"

1. M. *genufléxa*, Ag. (*knee-bent Mougeotia*); filaments slender fragile, at length genuflexed and irregularly united by short transverse tubes, endochrome half-filling the articulation, globules sphærical. — *Ag. Syst. Alg. p.* 83. — *Conferva genuflexa, Dillw. Conf. t.* 6.

In ditches and pools, very common; forming vast yellowish-green, or dull-yellow masses, often 30 feet in diameter. — *Filaments* very fragile; *endochrome* at first filling the tubes; but soon contracting into a longitudinal fascia.

2. M. *compréssum*, Ag. (*compressed Mougeotia*); filaments very fragile curved irregularly united by transverse tubes, endochrome compressed, globules sphærical. *Ag. Syst. Alg. p.* 83. — *Zygnema compressum, Lyngb. Hydroph. Dan. t.* 58.

In pools and ditches; near Appin, *Capt. Carmichael.* — Habit of the preceding; "*filaments* about as thick as those of *Zygnema quininum*, and remarkably fragile, flying asunder in single joints, which then become more or less curved; articulations 3—6 times as long as broad. The internal mass, occupying about two-thirds of the articulation, is collapsed or compressed, appearing, when its edge is presented to the eye, as a slender line running through the centre of the filament. *Sporidia* globular, lodged in the dilated transverse tubes." — *Carm. MSS.* This acute naturalist further remarks, "I am disposed to believe that each articulation of this species, if not of the whole genus, is a complete plant; in other words, that a filament is a chain of individuals, cohering somewhat in the manner of the genus *Salpa* among the *Mollusca*. In this point of view only, can I account for what I have often remarked, the junction of two articulations and the formation of a sporidium after they had been detached from their respective filaments. The inosculation of these single joints takes place in the most capricious manner, sometimes it is central, at others, the end of one joint is presented to the centre of the other, or they meet end to end forming a right, an acute, or an obtuse angle." *Carm. MSS.*

3. M. *cæruléscens*, Ag. (*blueish Mougeotia*); filaments slender fragile inosculating without tubes genuflexed, globules green cruciform. *Ag. Syst. Alg. p.* 83. — *Conferva cærulescens, E. Bot. t.* 2457.

Pools and ditches, rare. Boggy pool on Henfield Common, Sussex, *Mr. Borrer.* Appin, *Capt. Carmichael.* — "Where this plant occurs in a quantity and unmixed with Confervæ, it forms a greyish cloud in the water. *Filaments* extremely slender; articulations 5—6 times as long as broad, filled with a blueish fluid, through which passes a slightly spiral line of granules, joining without the intervention of transverse tubes, generally breaking off in pairs and then assuming the form of a cross, connected by the central cruciform sporidium." *Carm. MSS.*

69. TYNDARIDÉA.[1] *Bory.* Tyndaridea.

Filaments simple, finally inosculating by transverse tubes. *Endochrome* consisting of two subrotund masses (*stellæ*), which, after conjugation, unite and form a roundish globule (*sporidium*), lodged either in one of the articulations, or in the connecting tube. Name: *Tyndaridæ;* the constellations so called of *Castor* and *Pollux*, incorrectly spelled "Tendaridea" by Bory in *Dict. Class. d'Hist. Nat.*

1. T. *cruciáta*, Harv. (*cross-like Tyndaridea*); stellæ roundish, sporidia subglobose lodged in one of the filaments.—*Zygnema cruciatum, Z. gracile* and *decussatum, Ag. Syst. Alg. p.* 77—78.—*Conferva bipunctata, Dillw. Conf. t.* 2. and *C. decussata, Syn. Conf. p.* 51.

In ditches and pools, common. — This forms extensive masses of a yellowish-green colour, finally rising to the surface. Articulations marked by two roundish dots, which, after conjugation, unite to form a globular *sporidium* in one of the filaments.

2. T. *epigæ'a*, Harv. (*ground Tyndaridea*); "filaments interwoven into a crisped stratum, articulations once and a half as long as broad, granular mass dense scarcely bipartite, sporidia globose lodged in one of the filaments." *Carm.*—*Zygnema epigæum, Carm. MSS.*

On road-sides and frequented paths; Spring to Autumn, *Capt. Carmichael.*—"*Filaments* an inch or more in length, as thick as those of *T. cruciata*, spreading, to an indefinite extent, in a thin intricate yellowish fleece over the dry naked earth; here and there grouped and curled in a most characteristic manner. *Articulations* 1—3 times longer than broad, and remarkably opaque; internal mass partially separating into two square smooth portions. *Sporidia* sphærical, lodged in one of the filaments." *Carm. MSS.*

3. T. *pectináta*, Harv. MSS. (*comb-like Tyndaridea*); stellæ transversely linear pectinate, globules contained in the swollen transverse tubes.—*Zygnema pectinatum, Ag. Syst. Alg. p.* 78.—*Conferva bipunctata, E. Bot. t.* 1610. (*not t.* 2463. *f. B.*).—*C. bipartita, E. Bot. t.* 2302?

In stagnant water, common.—"This, like *Z. cruciatum*, occurs in large yellowish floating masses. They are often found intermixed, nor is there any thing to distinguish them from each other, in their usual state, but the transversely oblong shape of the internal dots; which results probably from the shortness of the articulations. In a state of junction, however, the position of the sporidia leaves no doubt that they are distinct species. *Carm. MSS.*

4. T. *bícolor*, Harv. MSS. (*variegated Tyndaridea*); filaments simple slender straight bright-green, joints thrice as long as broad white-edged even several of them together here and there empty white and pellucid.—*Conferva bicolor, E. Bot. t.* 2288.

On stones, in a rapid streamlet at Henfield, Sussex, *Mr. Borrer.*

[1] In the Synopsis of the Genera, this is inaccurately spelled *Tentaridea*, and the character is different from the amended one here given.—*W. H. Harvey.*

70. Zygnéma. *Ag.* Zygnema.

Filaments articulated, simple, finally united by transverse tubes. *Endochrome* forming dotted, spiral rings, which, after conjugation, are condensed into a globule in one of the filaments. — Name, ζυγος, *a yoke,* and νημα, a *thread;* aptly expressive of the curious conjugation of the filaments.

1. Z. *nítidum,* Ag. (*shining Zygnema*); filaments dark-green parallely joined, articulations with numerous arching spires. — *Ag. Syst. Alg. p.* 82. — *Conferva princeps, Vauch.* — *C. nitida, Dillw. Conf. t.* 4. *f. C.* (*bad*).

In ditches, not rare. — *Filaments* dark-green, intensely lubricous, as thick as horse-hair, rigid, forming large masses. *Articulations* usually a little longer than broad; but Capt. Carmichael has found them six times as long as their diameter. After conjugation, the *filaments* become crisped, fragile, and lose much of their lubricity; the spires are soon after deranged and the contents of one articulation discharged through its tube into the opposite one, where they form a dark-coloured globule. The other species undergo similar changes.

2. Z. *decimínum,* Ag. (*two-spired Zygnema*); filaments dark-green parallely joined, spires double cruciate. — *Ag. Syst. Alg. p.* 81. — *Conferva jugalis, Dillw. Conf. t.* 5. and *C. nitida, t.* 4. *f. A. B.*

Ditches extremely common. — Very variable in the length of the joints. *Spires* double, crossing each other, like a continual multiplication of the Roman numeral X, whence the specific name.

3. Z. *quinínum,* Ag. (*one-spired Zygnema*); filaments pale yellow-green parallely joined, spires simple. — *Ag. Syst. Alg. p.* 80.; *also Z. longatum and condensatum of the same author.* — *Conferva spiralis, Dillw. Conf. t.* 3. *and C. longata, Syn. Conf. p.* 49.

Ditches and ponds, very common, forming cloudy pale-green masses. — *Filaments* marked with a spiral line, resembling a multiplication of the numeral V.

4. Z. *curvátum,* Ag. (*curved Zygnema*); filaments green unbranched very slender here and there slightly bent and combined by their angles, joints cylindrical four times as long as broad, colouring matter in a triple irregular series of dots. *Sm.* — *Ag. Syst. Alg. p.* 79. — *Conferva stictica, E. Bot. t.* 2463.

Ditches in Henfield level, Sussex, *Mr. Borrer.* — This species appears to be intermediate between the Genera *Mougeotia* and *Zygnema.* "When young, the colour is a dull pale-green, and about 3 imperfectly spiral lines of shining granules are with difficulty distinguishable: afterwards these lines become more conspicuous, the rest of the filaments being now perfectly colourless, and their component granules larger, but their arrangement is still irregular. The threads subsequently unite here and there, not by every joint, and their connecting processes are usually nearer to one end of the joint than to the other. Such filaments are divaricated at the points of connection, rather less abruptly than in *Z. geniflexa.* In some of the combined joints the contents appear un-

changed, in others they form a mass of larger granules than in the lines; and some have a large oval seed, which often swells the joints. Traces of unchanged lines occur, now and then, in the fructifying joints." *E. Bot.*

Tribe XVII. Oscillatorieæ.

Plants green or brown, rarely purple, continuous, tubular, seldom branched, though often agglutinated together, so as to appear branched. Fructification; an internal mass, divided by transverse septa, finally separating into roundish or lenticular sporidia.—Fresh-water, marine, or on damp ground.

71. Stigonéma. *Ag.* Stigonema.

Filaments cylindrical, cartilaginous, branched, inarticulate, including granules ranged in transverse dotted rings.—Name; στιγων, *dotted*, and νημα, *a thread.*

1. S. *atrovírens*, Ag. (*black-green Stigonema*); tufted, branches slightly divided slender attenuated subacute, rings three-dotted. —*Ag. Syst. Alg. p.* 42.—*Conferva atrovirens, Dillw. Conf. t.* 25. —*Lichen pubescens, E. Bot. t.* 2318.—*Cornicularia pubescens, Ach.*—*Bangia atrovirens, Lyngb. Hydroph. Dan. t.* 25.

Wet rocks in subalpine glens, common.—Forming broad, rigid, very dark, loose tufts; *filaments* divaricately branched; branches much narrower than the stem, often furnished with a few slender, secund ramuli.

2. S. *mammillósum*, Ag. (*mammillated Stigonema*); branches simple incrassated fusiform densely mammillose.—*Ag. Syst. Alg. p.* 42.—*Bangia mammillosa, Lyngb. Hydroph. Dan. t.* 25. (*very bad*).

Bottoms of alpine rivulets, Appin, *Capt. Carmichael.* Eagle's Nest, Killarney, *W. H. Harvey.*—Forming continuous tufts, some inches in diameter, softer and more flaccid than the last; branches of various lengths, simple, fusiform, their diameter in the middle 2—5 times that of the stem, densely mammillose on all sides, and not unlike the *pickle* called "girkins" under the microscope. The *mammillæ* originate in the central matter, and are protruded through the cuticle; they are, doubtless, viviparous elongations of the granules. This supposed species, notwithstanding its very peculiar character, is perhaps only a *variety* of the preceding, occasioned by a moister habitat. Lyngbye's figure is very defective.

3. S. *pannifórme*, Harv. (*crust-like Stigonema*); filaments dark-brown densely packed together much branched, branches long flexuose obtuse, rings three-dotted.—*Scytonema panniforme, Carm. MSS.—Ag. Syst. Alg. p.* 39?

On rocks at the mouth of the Spar cave, Skye, *Capt. Carmichael.*—Patches indeterminate, crustlike, velvetty. *Filaments* so closely packed that only their apices are visible above the crust, very tough when dry, gelatinous when moist, cohering strongly together, much branched; branches long and flexuose, divaricating, cylindrical, quite obtuse, not tapered. *Granules* ternate, very obvious in all the main branches, less distinct towards the apices. This entirely agrees in external character and ramification, with the *Scytonema panniforme* of Agardh: with an

authentic specimen of which I have compared our plant. The only difference I can perceive lies in the generic character, and this, I am almost inclined to suspect, depends on age; for I find the apices of the branches simply striated, like a *Calothrix* or *Scytonema*, and the smaller branches, for at least part of their length, have the semipunctate appearance of *Scyt. ocellatum;* and it is only in the larger and main branches that the punctated character is clearly visible. Should my ideas prove correct, the *Stigonemata* must only be regarded as *Scytonemata*, arrived at full perfection.

72. Scytonéma. *Ag.* Scytonema.

Filaments branched (very rarely simple), flaccid, tough, continuous, tubular. *Endochrome* brown or olivaceous, transversely striated, "at length separating at the striæ into lenticular sporidia." *Carm.*—Name; σκυτος, a *skin*, and νημα, a *thread;* in allusion to the toughness of the filaments.—Agardh strangely places this genus between *Trentepohlia* and *Protonema*, with neither of which has it the least affinity. Captain Carmichael, whom I gladly follow in removing it to the *Oscillatorieæ*, remarks, with his usual acuteness, the strong affinity that subsists between it and *Lyngbya*, "the internal structure of the filaments being nearly, if not absolutely, the same in both: that is, the filaments in both are continuous tubes, filled with a transversely striated granular mass, which at length separates at the striæ into lenticular sporidia." *Carm. MSS.*—*Scytonema* is still more closely related to *Calothrix*, from which I find it very difficult to distinguish it by a satisfactory character.

1. S. *ocellátum*, Harv. (*beaded Scytonema*); filaments long gelatinous pale-brown flexuose, branches solitary slightly constricted at the base obtuse divaricating.—*Conferva ocellata, Dillw. Syn. Conf. p.* 60. *t. D.*—*E. Bot. t.* 2530. (*not S. ocellatum, Lyngb. Hydroph. Dan. t.* 28.)—*S. myochrous, β. ocellatum, Ag. Syst. Alg. p.* 40. (*according to the references to Dillw. and E. Bot.*).

Alpine bogs.—*Filaments* tufted, erect or decumbent, gelatinous, pale yellow-brown, twice or thrice as thick as those of *S. myochrous*, branched; *branches* irregularly disposed, issuing from the *centre* of the filament, somewhat attenuated at their base, very obtuse and slightly thickened at the extremity, erecto-patent, solitary or extremely rarely in pairs, the larger ones with a few short ramuli. *Sporidia* distant, broad, at first quadrate, but becoming sphærical and finally longitudinally divided into two portions; margin of the filament very broad.—Agardh is surely not acquainted with the true *Conf. ocellata* of British authors, or he would scarcely have confounded it with *S. myochrous*, from which it differs in every, save the generic, character. Dillwyn well remarks, that it is most nearly allied to *Stigonema atro-virens*, and it seems indeed to be intermediate between *Scytonema* and *Stigonema;* the division of the sporidia, in old filaments, assimilating it to the latter genus. Lyngbye's figure and description belong to *S. myochrous*.

2. S. *compáctum*, Ag. (*compact Scytonema*); "filaments de-

cumbent branched densely interwoven into blackish tufts, branches suberect dichotomous and fasciculate, within furnished with transverse rings." *Grev.—Ag. Syst. Alg. p.* 38. *Lyngb. Hydroph. Dan. p.* 97. *t.* 28. *Grev. Edin. Crypt. p.* 302.

Moist rocks in the Pentland hills, *Messrs. Arnott and Greville.*—I give this on Dr. Greville's authority. I have examined his specimens; but can find little to distinguish them from the young of *S. panniforme*. The annuli are often bipartite.

3. S. *minútum*, Ag. (*dwarf Scytonema*); filaments minute erect rigid flexuose fastigiate collected in a dark crust, branches short.—*Ag. Syst. Alg. p.* 39.—*S. crustaceum*, *Ag. Syst. Alg. p.* 39?

On rocks and crustaceous lichens; common in alpine districts. Appin, *Captain Carmichael.* Carrigataha, near Caher, and at Killarney, *W. H. Harvey.*—Plant either spreading in a black suborbicular crust or scattered in little tufts: *filaments* erect, minute, closely packed, olivaceous; *branches* irregular, obtuse, ascending. I have made *S. crustaceum*, Ag. a synonym, more on Carmichael's authority than on my own observations; he remarks, "The difference between them hardly amounts to a specific one; without the aid of the dark central line, it would be nothing. But this, so far from being peculiar to *S. crustaceum*, is of common occurrence in all the species; so much so, that it might perhaps be adopted with advantage into the generic character, were it not that it seems to indicate a defect rather than a peculiarity, perhaps a failure from sterility in the sporaceous matter of the filaments." *Carm. MSS.*

4. S. *myóchrous*, Ag. (*Mouse-skin Scytonema*); filaments elongate mostly decumbent subrigid flexuose slender yellow-brown, branches issuing in pairs at right angles with the stem. —*Ag. Syst. Alg. p.* 40. *Lyngb. Hydroph. Dan. t.* 27.—*Conferva myochrous, Dillw. Conf. t.* 19. *E. Bot. t.* 1555.—*Conferva mirabilis, E. Bot. t.* 2219. (*according to the original specimens.*) —*Scyt. ocellatum, Lyngb. Hydroph. Dan. t.* 28. (*not of British authors*).

Alpine bogs and rivulets.—*Filaments* decumbent, rarely tufted, closely interwoven into a dark-brown stratum, very flexuose; branches simple, issuing in pairs at right angles, often adhering together throughout their whole length, but more generally soon divaricating, very rarely solitary. *Striæ* distant. The manner in which the branches are given off in this species is very curious, and quite unlike what takes place in *S. ocellatum*, so that this, were there no other characters, would afford abundant grounds of distinction between them. At first sight, they appear to be *appositional*, or resulting merely from the lateral coherence of two simple filaments. This, however, is not the case, as is proved by the tube above and below the point of ramification being continuous and unbroken, *at the opposite side* from the branches, as well as by tracing the various stages of the plant with a good microscope. The threads are at first simple continuous tubes, containing a coloured sporaceous mass (*endochrome*), which is closely marked with transverse striæ and broken, as if by dissepiments, at uncertain distances. Opposite these *dissepiments* a rupture takes place on one side of the *sheath*, and the *endochrome* issues in two columns, at first resembling mammillæ, but finally

elongating into branches. Can this be the origin of the *appositional* branches of the *Calothrices?* — *Conferva mirabilis; E. Bot. t.* 2219. (not of Dillw.) which Agardh in his last work makes a variety of *Sphacelaria cirrhosa*, I can refer with confidence to the present, having examined Miss Hutchins' specimens, from which Sowerby's figure was taken. Much confusion has arisen by Sir J. E. Smith's stating, that the plant was gathered "in Bantry bay," instead of "near Bantry." The specimens are parasitical on an *Orthotrichum* (probably *O. rivulare*), and their fresh-water locality is thus clearly proved.

5. S. *cirrhósum*, Carm. (*tufted Scytonema*); "tufts widely spreading, filaments floating in bundles spuriously" (?) "branched, branches beset with fragments towards the top." *Carm. MSS. cum Ic.*

Borders of lakes at Lismore island, *Capt. Carmichael.*—"It occurs in continuous fleeces, parallel to the water's edge, of a deep chestnut colour when lying flat, dark-olive when floating. The fleeces are made up of small contiguous fasciculi of interlaced filaments. The filaments are from half an inch to an inch in length, simple or spuriously (?) branched, and prolonged by the successive adhesion of portions seemingly of broken filaments, which at length coalesce and form a knot at the point of adhesion. The transverse spires are close and conspicuous." *Carm. MSS.* I rather suspect that what Carmichael terms *spurious* branches, have the same origin as the branches of *S. myochrous*, of which this species is perhaps a *variety*, though the habit is very different.

6. S. *contéxtum*, Carm. (*interwoven Scytonema*); "filaments mostly simple interwoven into a tough olivaceous stratum which turns to a dull-green in drying." *Carm. MSS.*

On the moist earth, Appin, *Capt. Carmichael.* Rocks at the foot of Turk Mountain, Killarney, *W. H. Harvey.*—"This species occurs in a thin, closely-matted, blackish fleece, of indeterminate extent. *Filaments* 2—3 lines in length, simple or rarely furnished with one or two branches," (which are occasionally geminate as in *S. myochrous*,) "interwoven into an almost inextricable stratum. *Sporidia*, when visible, which rarely happens, globular and rather distant. Besides the comparative shortness of the filaments, and the more intimate contexture of the stratum, this species differs from *S. myochrous* in becoming, when dry, of a light greyish-green colour, instead of black." *Carm. MSS.*

7. S. *byssoidéum*, Ag. (*downy Scytonema*); filaments minute erect simple flexuose fasciculate forming an unequal blackish crust.—*Ag. Syst. Alg. p.* 39.

On the trunk of a living Elm, at Oundle, Northampton, *Rev. M. S. Berkeley.*—This forms a very thin, effused, blackish, velvetty crust. *Filaments* exceedingly short, olivaceous, equal, very obtuse, erect, flexuose, often joined together laterally into little compressed tooth-like fascicles. *Annuli* close and evident.

73. CÁLOTHRIX. *Ag.* Calothrix.

Filaments destitute of a mucous layer, erect, tufted or fasciculate, fixed at the base, somewhat rigid, without oscillation. *Tube* continuous; *endochrome* green, densely annulated, at length dis-

solved into lenticular *sporidia*.—Name, καλος, *beautiful*, θριξ, a *hair*: the filaments being very slender and delicate.—Scarcely to be distinguished from *Scytonema*, but by the green colour and more membranous texture of the filaments.

* Confervicolæ: *parasitical, minutely fasciculate.*

1. C. *confervícola*, Ag. (*glaucous parasitical Calothrix*); filaments minute glaucous erect subulate rigid fasciculate.—*Ag. Syst. Alg. p.* 70.—*Conferva confervicola, Dillw. Conf. t.* 8., and *Suppl. t. A. E. Bot. t.* 2576.

On marine filamentous *Algæ*, very common.—*Filaments* 1—2 lines high, rigid, forming scattered or continuous tufts. "Internal mass at length consolidated into lenticular sporidia, which escape at the end of the tube, either singly or cohering in short cylinders." *Carm. MSS. cum Ic.*

2. C. *Berkeleyána*, Carm. (*Mr. Berkeley's Calothrix*); filaments minute bright grass-green flaccid flexuose fasciculate.

In fresh-water, adhering to aquatic plants. Oban, *Rev. M. J. Berkeley.*—"*Tufts* scattered, about a line in diameter, of a vivid green colour: *filaments* 20—30 in each tuft, radiating horizontally from a central point, exceedingly slender, flaccid, tapering to a hyaline point, variously curved or flexuose. It comes very near *C. confervicola;* but the filaments are much shorter and more slender, and possess nothing of the rigid erect habit of that species." *Carm. MSS. cum Ic.*

3. C. *Múcor*, Ag. (*transparent parasitical Calothix*); "filaments hyaline rigid straightish erect, forming olivaceous-green fascicles." *Ag. Syst. Alg. p.* 70.

On marine *Algæ*, at Brighton, *Mr. Borrer.*

4. C. *lutéola*, Grev. (*opaque parasitical Calothrix*); "filaments hyaline yellowish exceedingly slender elongated flexible scattered." *Grev. Crypt. Fl. t.* 299.

On marine filiform *Algæ*, rare; Appin, *Captain Carmichael.*—"Plant of a pale yellowish colour, investing the stems of the filiform Algæ with its numerous filaments and giving them a most delicate feathery appearance." *Grev.*—Captain Carmichael thus describes the plant in his MSS. "*Filaments* in small tufts, a line or two in length, exceedingly slender, tortuous, tapering, of a snow-white colour and so opaque as to appear intensely black when viewed against the light. Most of them are variegated with pellucid fasciæ, caused by the destruction or escape of the colouring matter. In the water, this minute parasite gives a downy appearance to the plants on which it grows." *Carm. MSS.*

5. C. *nívea*, Ag. (*white Calothrix*); filaments exceedingly slender rigid white forming dirty yellow continuous tufts.—*Ag. Syst. Alg. p.* 70.—*Conferva nivea, Dillw. Conf. t. C.—E. Bot. t.* 2529.

In sulphur springs. Yorkshire and Durham, *Dr. Willan.* Near Darlington, *Mr. W. Backhouse.*—"Dr. Willan assures us that this species is found below the spring, no further than as the water retains sensible

sulphureous qualities, as if the hepatic gas were necessary to its production and nourishment." *Dillw.*

** Velutinæ: *forming a continuous velvetty stratum on the surface of rocks.*

6. C. *scopulórum*, Ag. (*simple Rock Calothrix*); filaments minute erect curved flexuose simple subattenuate dirty-green agglutinated at the base forming a continuous velvetty stratum. —*Ag. Syst. Alg. p.* 70.—*Conferva scopulorum, Dillw. Conf. t. A. E. Bot. t.* 2171.

On marine rocks, near high-water mark, common; spreading in dark-green slippery patches.—The *filaments* are a line in height, flexuose, slightly attenuated to a subacute point, simple, slimy at the base, and under the microscope of a dull yellowish-green; striæ indistinct.

7. C. *fasciculáta*, Ag. (*branched Rock Calothrix*); filaments erect very straight dark-green subulate with a setaceous point fasciculately pseudo-branched, forming a continuous velvetty stratum.—*Ag. Syst. Alg. p.* 71.

Marine rocks, below high-water mark. Miltown Malbay, *W. H. Harvey.* —Stratum very dark, shining green. *Filaments* 2—3 lines high, tufted, erect, straight, attenuated to a long setaceous point. They are sometimes simple, but more generally furnished with 2—6 erect, close-pressed pseudo-branches; the striæ are strongly marked, and very closely set. The filaments, in my specimens, are longer, straighter, more acuminated, and of a darker colour than I find them in an authentic specimen from Agardh.

8. C. *ruféscens*, Carm. (*reddish Calothrix*); filaments very minute reddish spreading in a very thin slimy purplish stratum.

On rocks, under the spray of cascades: Appin, *Capt. Carmichael.*—"Crust or stratum of indefinite extent, and so thin as to seem a mere discolouration of the rocks, until the finger is passed over it, when a certain slimyness detects the presence of the plant. *Filaments* half a line in length, and so slender as to appear mere lines under the highest power of the compound microscope." *Carm. MSS.*

*** Cæspitosæ: *forming large tufts, filaments pseudo-branched.*

9. C. *interrúpta*, Carm. (*variegated Calothrix*); filaments thick subulate coriaceous glaucous-green short, cohering in tooth-like fascicles and forming broad tufts.

On mosses and lichens. Appin, *Capt. Carmichael.* Turk Cascade, Killarney and Tobermorey in the Isle of Mull, *W. H. Harvey.*—"Filaments about a line in length, of a glaucous-green colour, united into close, erect tufts, spreading over the moss, thick, tapering, cohering at the base, and sometimes through their whole length. *Internal mass* here and there interrupted, leaving short pellucid spaces, resembling articulations. *Striæ* close and conspicuous." *Carm. MSS. cum icone.*—The texture is decidedly coriaceous and the filaments so strongly agglutinated together in tooth-like fascicles, that it is with great difficulty they can be separated on the table of the microscope.

10. C. *hydnoídes*, Harv. (*Hydnum-like Calothrix*); filaments elongated flexuose cylindrical obtuse interwoven at the base, the

apices cohering in rigid erect tooth-like fascicles. —*Scytonema hydnoides, Carm. MSS. cum icon.*

On the clayey sea-shore, at the flood-level. Appin, *Captain Carmichael.* —" This species occurs in thin dark olive-coloured (black-green under the microscope) patches, from half an inch to 2—3 inches in diameter. Filaments much branched, the lower part interwoven into a thin stratum mixed with the clay over which they creep ; while the terminal branches stand erect in close conical tufts, resembling the teeth of a *Hydnum.*" *Carm. MSS.* —I have ventured to remove this plant from the genus *Scytonema*, in which it was placed by its acute discoverer, because the *branches* are *appositional*, and the *microscopic colour* of the filaments is of that peculiar shade of green so prevalent in the Genera *Calothrix* and *Oscillatoria*, and which does not occur in any acknowledged *Scytonema.*

11. C. *distórta*, Ag. (*large verdigris Calothrix*); filaments elongated bluish-green forming large tufts mucous somewhat rigid branched, branches erect flexuose. *Ag. Syst. Alg. p.* 72.—*Conferva distorta, Dillw. Conf. t.* 22. and *Suppl. t. A.—E. Bot. t.* 2577.

In fresh-water, on stems, &c., rather rare.—Filaments half to one inch high, forming continuous tufts about the stalks on which they grow, of a dark-green hue (when dry of an intensely verdigris or blue-green colour), slender, bundled, curved and tortuous, more or less branched by apposition, the branches subsimple, elongated. *Striæ* more or less evident, in some specimens inconspicuous.

12. C. *mirábilis*, Ag. (*small verdigris Calothrix*); filaments short dark bluish-green curvato-flexuose and geniculate variously united, forming lax globular tufts.—*Ag. Syst. Alg. p.* 72.—*Conferva mirabilis, Dillw. Conf. t.* 96. (*not of E. Bot. t.* 2219.)

On mosses, &c., in small streams; rare?—Filaments forming minute tufts, half an inch in diameter, of a dark bluish-green colour, irregularly contorted, forming geniculations with very obtuse angles, here and there appositionally united into a vague net-like ramification, apices obtuse. I am but little acquainted with this species, having described it from a specimen marked by Dillwyn, whose figure is very characteristic.

13. C. *cæspítula*, Harv. (*globular-tufted Calothrix*); filaments forming close convex tufts blackish-green flexuose flaccid obtuse here and there spuriously branched.

Marine rocks, below high-water mark. Miltown Malbay, rare, *W. H. Harvey.*—Tufts very convex, $\frac{1}{4}$—$1\frac{1}{2}$ inch in diameter, deep blackish-green, flaccid, growing on the naked rock or attached to corallines, &c. Filaments densely packed together, often twisted round each other in small bundles, either simple or pseudo-branched, obtuse, cylindrical, branches erect. Striæ very strongly marked and closely set. Not unlike *Rivularia atra* in its habit, at a short distance, but its softness and flaccidity will at once distinguish it to the touch.

74. Lyngbýa. *Ag.* Lyngbya.

Filaments destitute of a mucous layer, free, flexible, elongated, continuous, decumbent. *Endochrome* (green or purple) densely

annulated and finally separating at the annuli into lenticular sporidia.—A natural, but ill-defined genus, named by Agardh in honour of *H. C. Lyngbye*, an illustrious Danish Algologist, and author of an excellent work on the *Algæ* of Denmark.—From *Oscillatoria*, its elongated flexile filaments will at once distinguish it; but it is more difficult to point out the line between *Lyngbya* and *Calothrix;* though, in the typical species, the habit be altogether unlike.

* *Terrestrial.*

1. L. *murális*, Ag. (*Wall Lyngbya*); filaments somewhat rigid thickish tortuous interwoven into a bright grass-green stratum.—*Ag. Syst. Alg. p.* 74.—*Conferva muralis, Dillw. Conf. t.* 7. *E. Bot. t.* 1554.—*β. conjugata;* filaments united in pairs. *Carm. MSS.*

On damp walls, very common.—*β.* near the sea-shore at Appin, *Capt. Carmichael.*—Forming an intensely green stratum of indefinite extent; very conspicuous after a shower of rain. Striæ strongly marked.

** *Growing in fresh-water.*

2. L. *prolífica*, Grev. (*prolific Lyngbya*); "filaments exceedingly slender entangled purple very broadly effused floating." *Grev. Crypt. Fl. t.* 303.

In the loch of Haining, Selkirkshire, October to April.—"Plant extensively diffused, forming a floating stratum of a rich purple colour. *Filaments* extremely slender, entangled, somewhat rigid, yet flexible, entirely destitute of attachment and free from any mucous layer. Annuli, from the minuteness of the filament, almost inconspicuous." *Grev.*

*** *Marine.*

3. L. *majúscula*, Harv. (*large Lyngbya*); filaments very thick, issuing in long crisped bundles from a blackish-green stratum tortuous simple or slightly pseudo-branched.—*Conferva majuscula, Dillw. Conf. Suppl. t. A.*

Santon sands, *Miss Hill.* Bantry Bay, *Miss Hutchins.* Torbay, *Mrs. Griffiths.*—*Filaments* forming blackish-green, interwoven strata, from which they issue in crisped bundles, 1—2 inches long, very tortuous, simple or occasionally agglutinated together, so as to appear branched. Diameter greater than that of any of the genus, twice or thrice as great as that of *L. muralis.* *Endochrome* dull-green, *annuli* difficult to observe, close-set; *tube* broad, hyaline. A fine species, that Agardh erroneously refers to his *L. crispa*, which, according to an authentic specimen, is a very different plant, of a verdigris-green colour and thrice as slender.

4. L. *ferrugínea*, Ag. (*rusty Lyngbya*); filaments slender flaccid forming a lax stratum of a verdigris-green colour, which gradually changes to a pale chestnut.—*L. ferruginea, β. versicolor, Ag. Syst. Alg. p.* 73.—*L. subsalsa, Carm. MSS.*

In small mud-bottomed pools, near the sea-shore, filled at Spring-tides. Appin, *Capt. Carmichael.* — Stratum exceedingly thin and lax, extensive, at first of a vivid-green colour, but passing gradually into a pale chestnut." *Carm.* — Filaments an inch long, flaccid, bent in various curves, but scarcely tortuous, of a pale verdigris colour under the microscope; striæ rather evident and subdistant. Capt. Carmichael's plant is of a dull-verdigris hue, without gloss. I have compared it with an authentic specimen from Agardh, and can detect no difference, except in colour, which, according to Carmichael, varies with the age of the individual. Agardh's β. appears to answer the British plant very exactly.

5. L. *Carmichaelii*, Harv. (*Capt. Carmichael's Lyngbya*); filaments very long thickish curled and tortuous cylindrical floating under water and forming extensive grass-green strata.—*L. crispa, Carm. MSS. cum ic.* (*not of Agardh.*)

Marine rocks and Fuci. Appin, *Capt. Carmichael.*—" Stratum almost co-extensive with the object on which it grows. On *Fucus vesiculosus* it may be found upwards of a foot in extent, on the rocks, of 20—30 yards, covering them with an intensely green fleece. *Filaments* fixed at the base, but fluctuating freely with the agitation of the water; several inches long, flaccid, at length becoming curled and convoluted, when the sporidia, bursting through the tube, leave it partially empty and pellucid." *Carm.* — Transverse striæ very evident and subdistant. When dry it is of a dull green, without gloss or any glaucous or verdigris hue, and, to the naked eye, strongly resembles *C. rivularis*. Lyngbye's figure of *Conf. contorta* would correspond with it very well; but the description does not.

6. L. *speciósa*, Carm. (*beautiful Lyngbya*); filaments long thick flaccid straight at length curled, the margin crenate, freely floating in the water and forming extensive bright-green strata. —*Carm. MSS. cum ic.*

Marine rocks and Fuci. Appin, *Captain Carmichael.*—" This plant covers the whole surface of the rock or stone, floating loosely in the water; but, when left by the tide, spreading over it in a thin intensely green fleece. The filaments are twice as thick as those of the former species, 3—4 inches long, straight and flaccid, at length becoming curled and crenated by the marginal protrusion of the sporidia. These are of a very flat lenticular form, and when ripe burst through the sides of the tube, leaving it here and there colourless." *Carm. MSS.* When dry, it is of a deep glossy yellow-green.

75. Rosária. *Carm.* Rosaria.

Filaments continuous, tubular, loculoso-contracted at equal distances. *Loculi* containing two *sporidia.* — Name: *rosarium, a rosary* or string of beads. — Capt. Carmichael, in proposing this genus, remarks, "The very minute plants which I have referred to this genus may have been described before: perhaps they are to be found in the genus *Fragilaria* of Lyngbye and *Meloseira* of Agardh; but I confess I cannot identify either of them with any of the species described by these authors. To be admissible into either of these genera, the filaments ought to be plane and articulated; but, from the most minute inspection

I could make, the filaments in the two following species are cylindrical and not articulated but merely contracted at certain equal distances into a series of imperfect or pervious cells, each including a couple of sporidia. These contractions form the only essential difference between this genus and *Lyngbya.*" *Carm. MSS.*

1. R. *lentígera*, Carm. (*short-jointed Rosaria*); locules strongly contracted, as long as broad, sporidia lenticular.

On various small *Algæ*. Appin, rare, *Captain Carmichael.*—"*Filaments* gregarious, 1—2 lines in length, curved, of an olive colour, regularly contracted at equal distances to one-fourth of the diameter of the tube; cells as long as broad, containing two lentiform sporidia. At first, the sporidia are in one mass, marked only by a transverse stria." *Carm. MSS.*

2. R. *globífera*, Carm. (*long-jointed Rosaria*); locules subcontracted twice as long as broad, sporidia globular.

On *Ulva? percursa;* extremely rare. Appin, *Capt. Carmichael.*—"*Filaments* scattered, 1—2 lines in length, of a fulvous colour, not above half the diameter of the preceding species. Cells slightly contracted, twice as long as broad, containing two globular sporidia." *Carm. MSS.*

76. Oscillatória.[1] *Vauch.* Oscillatoria.

Filaments invested by a common mucous matrix, rigid, elastic, oscillating, simple, continuous. *Endochrome* divided by close

[1] *Captain Carmichael* has the following ingenious remarks under *Oscillatoria*, in his unpublished "*Algæ Appinenses.*" "I have been induced to bestow considerable attention on such of the species as fell under my notice, on account of the singular motion remarked in the filaments by various Naturalists; and I do confess, that the result is something like conviction that they belong rather to the animal than to the vegetable kingdom. This motion or oscillation has been attributed to various causes; to the rapidity of growth, to the action of the light, or to the agitation of the water in which the specimens were immersed for inspection; but none of these affords a satisfactory explanation: the last may be put to the proof by a very simple contrivance. Let a small portion of the stratum be placed in a watch-glass nearly filled with water, and covered with a circular film of talc, so that its edge may touch the glass; the water will be rendered as fixed as if it was a piece of ice. The glass may now be placed under the microscope, and the oscillation of the filaments viewed without any risk of disturbance from the agitation of the water; by following this course, it will be speedily perceived that the motion in question is entirely independent of that cause.

"The action of light, as a cause of motion, cannot be directly disproved, because we cannot view our specimens in the dark; but indirectly there is nothing easier. If a watch-glass, charged as above, be laid aside for a night, it will be found that by next morning, not only a considerable radiation has taken place, but that multitudes of the filaments have entirely escaped from the stratum; both indicating motion independent of light. Rapidity of growth will show itself in a prolongation of the filaments, but will not account for this oscillation to the right and left: and still less for their travelling in the course of a few hours to the distance of ten times their own length from the stratum. This last is a kind of motion, unexampled, I believe, in the vegetable kingdom. There is another point in the natural history of the *Oscillatoriæ*, which favours the opinion that they are animalculæ. It is the extremely limited term of their

parallel transverse striæ. — Named from the curious *oscillatory* or lateral motion of the filaments. — The species are very numerous and almost impossible clearly to be defined, their characters chiefly depending on external habit. In the following descriptions, the *colour* of the *strata* always refers to the appearance presented to the naked eye; that of the *filaments*, to what they appear under the microscope.

* Fasciculatæ. *Filaments collected into close rigid agglutinated fascicles.*

1. O. *Friesii*, Ag. (*Fries' Oscillatoria*); stratum bright-green bristling with the elongated rigid erect tooth-like fascicles of filaments. — *Ag. Syst. Alg. p.* 61. — *Scytonema Bangii, Lyngb. Hydroph. Dan. t.* 28. *Fl. Dan. t.* 1602. *f.* 1. *Grev. Fl. Edin. p.* 303.

On mosses, in shady subalpine situations; near Edinburgh, *Dr. Greville*. Appin, *Captain Carmichael*. Tobermorey in Mull, *W. H. Harvey*. — *Stratum* 2—3 inches broad, bright æruginose-green. *Filaments* closely interwoven into erect, elongated, tooth-like fascicles, an inch or more in height, pale-green (under the microscope), annulated within with a broad limb. Well marked by its erect, spinulose habit.

2. O. *lucífuga*, Harv. (*small spiny Oscillatoria*); stratum blackish-green bristling with minute tooth-like fascicles of filaments. — *Calothrix lucifuga, Carm. MSS.*

"On the decayed trunk of an Alder, lying in a ravine and buried under a heap of rubbish," at Appin, *Captain Carmichael*. — *Stratum* spreading, dull blackish-green, bristling all over with minute erect fascicles, about $\frac{1}{3}$ of a line high. *Filaments* thickish, flexuose, strongly agglutinated together, annulated within, pale-yellowish. Almost like the last species in miniature.

3. O. *chthonoplástes*, Hoffm. (*sheathing Oscillatoria*); stratum dull-green, filaments parallel penicillating from the apex of the decumbent elongated flexuose sheath-like fascicles. — *Lyngb. Hydroph. Dan. t.* 27. *Ag. Syst. p.* 62. — *Conferva vaginata, E. Bot. t.* 1995. (*scarcely of Dillw. Conf. t.* 99.) — β. *repens*; of a duller colour with more flexuose fascicles. — *O. repens, Ag. Syst. Alg. p.* 61.

a. on the muddy sea-shore. Appin, *Captain Carmichael*. — β. on the naked soil by road-sides, &c. — *Stratum* slimy, composed of entangled, decumbent, sheathing fascicles, collected into little bundles. The sheaths, Captain Carmichael observes to appear, as if composed "of the old dead filaments, deprived of their colour and agglutinated together."

4. O. *tenuíssima*, Ag. (*slender fascicled Oscillatoria*); dark-

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existence. The community, if I may so call it, lives for several months; but the individuals die off, and are succeeded by others with a rapidity to which there is no parallel among genuine plants. If a small portion of stratum, say one-fourth of an inch in diameter, be left for 3 or 4 days in a watch-glass, filled with water, the whole area of the glass will be found covered with a thin transparent pellicle or incipient stratum, derived from the filaments that had successively radiated and died in the course of that short period."

green ascending tufted, filaments simple cylindrical even without any visible joints. *Sm.*—*Ag. Syst. Alg. p.* 62. *E. Bot. t.* 2584.

In the celebrated warm waters of Bath, spreading, rather unequally, in broad velvet-like patches, of a dark-green colour, *Rev. Dr. Davies.*—"The irregularity of its appearance arises from the filaments being collected together into little ascending tufts, apparently rooted in the muddy deposit of the water. Each tuft proves, on examination, to consist of simple, uniform, even *filaments*, crowded together and quite pellucid and equally destitute of joints and branches; their diameter is not more than an eight or ten-thousandth part of an inch." *Sm.*

** Virescentes. *Stratum of an æruginose or blue-green colour.*

5. O. *limósa*, Ag. (*green Mud Oscillatoria*); stratum rich dark-green glossy gelatinous with long rays, filaments green thick straight and rigid, striæ strongly marked and very closely set.—*Ag. Syst. Alg. p.* 66. (*not of Grev. Fl. Edin. p.* 303. *nor Hook. Scot. P. II. p.* 79.)

Ditches and pools.—*Stratum* of very rapid growth and intensely rich dark-green colour, sending out long radii, equally or in bundles, of scarcely a paler hue than the stratum. *Filaments* thicker than in any other British species, bluish-green (under the microscope) vividly oscillating.—This fine species is apparently alluded to by Dillwyn, in his description of *Conferva fontinalis*, *t.* 64.; but the figure is more like *O. nigra*. In drying, it adheres closely to paper. From *O. major*, it differs in the much greater diameter of its filaments, and darker colour; and from *O. princeps* (apparently), in the smaller size and brighter colour. It is therefore intermediate between these species.

6. O. *ténuis*, Ag. (*lesser Mud Oscillatoria*); stratum rich dark-green very thin gelatinous with short rays, filaments pale-green straight and rigid, striæ distant not strongly marked.—*Ag. Syst. Alg. p.* 65. *Grev. Fl. Edin. p.* 303.—*O. limosa, Hook. Scot. P. II. p.* 79.—*Conferva limosa, Dillw. Conf. t.* 20.—*O. viridis, Johnst. Berw. Fl. p.* 264.

In muddy ditches, at first resting on the bottom; but gradually rising in bullated strata to the surface; common.—*Stratum* extensive, glossy when dry, in which state it fully preserves its colour. *Filaments* half the diameter of those of *O. limosa*, pale-green; striæ distant and indistinct. It adheres strongly to paper.

7. O. *cyánea*, Ag. (*bluish Oscillatoria*); glaucous-blue, filaments simple entangled cylindrical even with a deciduous coat, joints obsolete about as broad as long. *Sm.*—*Ag. Syst. Alg. p.* 68. *E. Bot. t.* 2578.

Damp walls on the inside of several Suffolk churches, as Icklingham and Hengrave; also in Lancashire, *Sir Thomas Gage, Bart.*—"On the wall it is conspicuous for its light sky-blue colour, like some sort of *Mucor*. Under a high magnifier, and when moistened, it is found to consist of minute, even, simple, entangled threads, one 500th part of an inch in diameter, coated with a frequently interrupted covering, of a dull glaucous-green hue, under which the thread itself appears of a lighter glaucous-bluish colour, very even in thickness and surface, consisting of scarcely distinguishable joints, about as broad as they are long." *Sm.*

8. O. *spléndida*, Grev. (*bright-green Oscillatoria*); stratum bright æruginose or blue-green thin with short rays, filaments arachnoid straight or curved, striæ wholly invisible.—*Grev. Fl. Edin. p.* 304.

In tubs of water, in the stove of the Botanical Garden, Edinburgh, *Dr. Greville.*—"*Filaments* under the highest power of the microscope, appearing not larger than a human hair and of a very pale bluish colour. It has the colour and external characters of *O. major*, but cannot be confounded with it when magnified." *Grev.*

9. O. *muscórum*, Ag. (*Moss Oscillatoria*); stratum dark æruginose-green shortly radiating creeping over mosses, filaments thickish pale blue-green, striæ distant.—*Ag. Syst. Alg. p.* 65.

"On *Hypnum ruscifolium*, in rapid streams." *Captain Carmichael.*—"*Stratum* 3—4 inches in extent, closely interwoven with the branches and leaves of mosses, of a bluish-green colour and slightly lubricous. *Filaments* a line or two in length, variously curved and radiating; striæ at the distance of a diameter from each other." *Carm. MSS.*

10. O. *turfósa*, Carm. (*Turf Oscillatoria*); stratum pale verdigris-green glaucous with an ochraceous substratum, filaments very slender curved hyaline, striæ distant.

"On a parcel of floating sods in an old turf-pit," *Capt. Carmichael.*—"This species grows in a thick, intensely green layer, over a tough slimy ochre-coloured substratum. It entirely enveloped the sods, some of which were a foot and a half in diameter. Filaments very slender, more or less curved, and mostly hyaline at the point." *Carm.* It does not adhere to paper in drying.

11. O. *decórticans*, Grev. (*Riband Oscillatoria*); stratum smooth glaucous-green membranaceous, filaments very slender curved pale bluish-green, striæ distant.—*Grev. Fl. Edin. p.* 304. (*excl. syn. Lyngb.*)—*Conferva decorticans, Dillw. Conf. t.* 26.—*β. corticola*; stratum blackish green. *O. corticola, Carm. MSS.*

Damp walls, rotten timber, &c., common.—*β.* "on the trunk of an old sycamore, where the rain-water trickled down." *Capt. Carmichael.*

12. O. *limbáta*, Grev. (*margined Oscillatoria*); "filaments thick flexuose æruginose with a broad pellucid margin, loosely interwoven in a dense dull æruginose-green stratum." *Grev. Crypt. Fl. Syn. p.* 40. *et t.* 246. (*O. rupestris.*)

On perpendicular rocks, exposed to the trickling of water. Pentland hills, *Dr. Greville.*—"Plant covering the face of the rock for several inches together, and, when old, peeling off in rather large pieces. Externally, it is mostly of a dull and often brownish-green colour; but within, more or less of a verdigris-green, differing in intensity in different parts; here and there gelatinous and semitransparent. *Filaments* thick for their length, very flexuose, with a pellucid colourless limb, equal in breadth to the coloured striated portion, which is of a pale verdigris-green." *Grev.*

13. O. *littorális*, Carm. (*Shore Oscillatoria*); stratum vivid æruginose-green, filaments thick deep-green curved, striæ conspicuous close.

In pools, along the muddy sea-shore, flooded by spring-tides. Appin, *Capt. Carmichael.*—" *Stratum* exceedingly thin, slimy, bullated by the extrication of air-bubbles, of a dark-green colour, spreading to an indefinite extent over the muddy bottom of the pool. *Filaments* 1—2 lines in length, much thicker than those of *O. nigra*, straight or slightly curved, radiating very irregularly and generally in twisted bundles. *Striæ* strongly marked, at intervals of about one-third the diameter of the filament." *Carm. MSS.*—Mostly allied to *O. limosa*. In a dry state, it is membranaceous, and scarcely adheres to paper.

14. O. *subsálsa*, Ag.? (*submarine Oscillatoria*); stratum membranaceous æruginose-green smooth, filaments slender densely interwoven, striæ distant indistinct.—*Ag. Syst. Alg. p.* 66?

At Brighton, " on a plank, between high and low-water mark," *Mr. Borrer.*—*Stratum* æruginose or bluish-green, smooth, without gloss, when dry, peeling off in membranaceous flakes; *filaments* hyaline, slender, densely packed, either straight or curved; *striæ* not very evident. In habit, it somewhat resembles *O. littoralis;* but the filaments are much slenderer, and the stratum more membranaceous.

*** Nigrescentes. *Stratum of a dull indistinct green, or inclining to purple, black or brown.*

15. O. *nígra*, Vauch. (*blackish Oscillatoria*); stratum blackish-green (when dry bluish-black) with long radii, filaments pale bluish-green thick, striæ very distinct and close.—*Hook. Scot. P. II. p.* 79. *Ag. Syst. Alg. p.* 63.—*Conferva fontinalis, Dillw. Conf. t.* 64.—*O. limosa, Grev. Fl. Edin. p.* 303. (*not of Ag.*)

Ditches and ponds, common.—*Stratum* extensive, blackish with a shade of green, when dry blue-black, very rapid in its growth and sending out long, vividly oscillating rays. Dillwyn's figure of *Conferva fontinalis* answers this species pretty correctly; but his description seems to take in many others.

16. O. *autumnális*, Ag. (*autumnal Wall Oscillatoria*); stratum purplish or greenish-black very lubricous shortly radiating, filaments pale bluish-green, striæ subdistant.—*Ag. Syst. Alg. p.* 62. *Lyngb. Hydroph. Dan. p.* 95. *Grev. Fl. Edin. p.* 305.

On damp walls, abundant in autumn and winter.—*Stratum* extensively spreading, very dark and lubricous, glossy when dry; *filaments* remarkably pale; striæ not very evident.

17. O. *contéxta*, Carm. (*satin-like Oscillatoria*); stratum glossy black strongly striated, filaments thickish pale-green, striæ subdistant.

On moist ground; Appin, *Capt. Carmichael.*—" Stratum of indefinite extent, three feet and upwards, exceedingly thin and peeling off in large flakes in dry weather, of a deep but shining black colour, scored or striated in all directions. These striæ are caused by thick fasciculi of filaments, shooting out either parallel to or across each other, changing their course from time to time, and sending off lateral fasciculi. The

filaments are rather thick, about a line in length, straight or variously curved, of a greyish-green colour, and they radiate with great rapidity. A portion of the stratum, not more than a line in diameter, placed on a watch-glass, filled with water, overspread the whole area of the glass with filaments in the course of a night." *Carm. MSS.* A fine species; in a dry state strongly resembling black satin. The striated stratum affords an excellent " prima facie " character.

18. O. *Córium*, Ag. (*leathery Oscillatoria*); stratum thick subcoriaceous opaque dull-brownish streaked with pale-green, filaments yellowish slender, striæ indistinct distant. — *Ag. Syst. Alg. p.* 64. *Lyngb. Hydroph. Dan. p.* 89. *Grev. Fl. Edin. p.* 303.

On the rocky bottoms of alpine rivulets ; common.—*Stratum* thick, tough, dull-brownish, occasionally streaked with pale-green, which, in some varieties, is the prevailing colour, slightly glossy when dry ; *filaments* slender. In some situations it radiates fasciculately from its whole upper surface ; in others, it is found almost denuded of radii and forming a compact leathery stratum.

19. O. *subfúsca*, Vauch. (*brownish-green Oscillatoria*); stratum dull greyish-brown somewhat streaked with a green shade soft void of tenacity, filaments very slender hyaline straight, striæ inconspicuous. *Lyngb. Hydroph. Dan. t.* 26. *Ag. Syst. Alg. p.* 69.

Rocks and stones, in sub-alpine rivulets.—*Stratum* extensive, " soft, slimy, void of tenacity, wrinkled, of a dusky-grey colour," (*Carm.*) when dry greyish-brown, streaked with green towards the edges ; *filaments* very slender, striæ invisible.—Differs from the last chiefly in being more gelatinous and fragile.

20. O. *violácea*, Johnston, (*purple Oscillatoria*); " mass gelatinous dark purple, filaments very slender straight without perceptible transverse striæ laid on a thin compact greenish substratum." *Johnst. Berw. Flora, v.* 2. *p.* 264.

Rapid streams ; near Berwick-upon-Tweed, *Dr. Johnston*, who considers this the " *Conf.*, mucosa confragosa, rivulis innascens" of Dillenius.

21. O. *rupéstris*, Ag. (*Rock Oscillatoria*); stratum blackish-green thick opaque extremely tough, filaments rigid straight pale-green slender, striæ not evident. *Ag. Syst. Alg. p.* 63. *Carm. MSS.* — *O. tenax, Carm. Herb.*

On the precipitous face of cascades; Appin, *Capt. Carmichael.*—" Stratum extensive, slimy, remarkably tough and elastic, black on the surface, ash-coloured underneath, (when dry greenish-black) : *filaments* pale-green, straight or variously curved, radiating, but not equally, in all directions." *Carm. MSS.*—Differs from *O. subfusca* in habitat, colour, and toughness of the stratum ; which last peculiarity is very characteristic. When dry, it is difficult to separate the filaments on the table of the microscope.

22. O. *spirális*, Carm. (*spiral Oscillatoria*); stratum coriaceous greenish-black without lubricity, filaments spirally twisted radiating in all directions.

" On rocks, by the sea-side, where birds are in the habit of resting;" Appin, *Captain Carmichael.* — " It spreads over the dry naked earth. Stratum several feet in extent, firm, coriaceous, of a glossy black colour, void of lubricity. *Filaments* about half a line in length, twisted like a cork-screw, radiating in all directions." *Carm. MSS.*

23. O. *spadícea, Carm.* (*chestnut-coloured Oscillatoria*); stratum dark chestnut-colour very thin spreading, filaments yellowish-brown thick variously curved and twisted, striæ conspicuous and very close.

On damp mossy earth; " rare." Appin, *Captain Carmichael.* — " It occurs as a very thin dark-brown stratum, spreading to the extent of several feet, and is hardly to be distinguished from the mossy earth on which it grows. *Filaments* short, straight, curved, or spirally twisted, radiating in every direction and possessed of all the movements peculiar to the tribe." *Carm. MSS.* — A very distinct species. The filaments strongly resemble those of a *Scytonema*, in which genus I should not hesitate placing it, had not Carmichael observed its oscillating character.

24. O. *ochrácea*, Grev. (*fragile Oscillatoria*); forming floating cloud-like very fragile masses of an ochrey colour, filaments scattered very slender acicular. *Grev. Fl. Edin. p.* 304. — *Conferva ochracea, Dillw. Conf. t.* 62.

In boggy pools, common.— This species occurs in cloud-like masses, scarcely to be called strata; the *filaments* are very slender, and scattered without order. Dillwyn's figure and description incorrectly represent them as branched; and Lyngbye's (if indeed his be the same species) as thick and strongly striated. Agardh considers it to be some other species in decay.

25. O.? *aláta*, Carm. (*winged Oscillatoria*); stratum subgelatinous chestnut-brown, filaments curved bordered by a broad waved membranaceous marginal expansion. *Grev. Crypt. Fl. t.* 222.

On wet, calcareous cliffs. Appin, *Captain Carmichael.* — " *Stratum* of indeterminate extent, thin, rather gelatinous, of a chestnut colour. *Filaments* about half a line in length, simple or sometimes cohering laterally, variously curved, and edged on each side with a membranous expansion thrice their own diameter. No oscillation or radiation (?). The bordering membrane is so very singular a character, that it is with some diffidence I admit this production to a place among the *Algæ*. In the mean time, until future observations enable us to judge of its real nature, it will rank with most propriety in a genus, all the members of which are equally doubtful." *Carm. MSS.*

77. Belónia. *Carm.* Belonia.

Filaments minute, acicular, heaped together, submoniliform, finally dissolving into elliptic sporidia. — Name; *βελονη*, a *needle*, from the acicular filaments. — Differing from *Oscillatoria* in the absence of a gelatinous substratum, and from *Lyngbya* in the nature of the filaments.

1. B. *torulósa*, Carm. (*torulose Belonia.*)

On decaying marine Algæ, about half-tide level, *Captain Carmichael.*— "In the beginning of autumn, vast quantities of the filamentous Algæ (*Dictyosiphon Ectocarpus*, &c.) are detached from their places of growth and deposited here and there along the shore in extensive fleeces. When these fleeces begin to decay, the *Belonia* makes its appearance in the form of a very thin gelatinous pellicle of a vivid-green colour, spreading over the surface of the decaying mass. The pellicle is made up of straight, brittle, slightly moniliform *filaments*, one-fourth of a line in length and tapering at both ends. The intervals between the striæ are considerably longer than their diameter, and the green matter becomes at length consolidated into elliptical sporidia, of a brownish colour, beginning at the middle of the filament." *Carm. MSS.*

Tribe XVIII. Byssoideæ.

Plants of doubtful affinity, related to the Fungi. Filaments articulated, hyaline or coloured. Fructification; granules scattered among the filaments, or capsules.—Found on rotten wood, among mosses, on the ground, on glass, or in chemical solutions: a few inhabit fresh-water, and one or two the sea.

78. Byssocládium. *Ag.* Byssocladium.

Filaments arachnoid, radiating from a centre, with scattered external *granules.*—Name, βυσσος, a kind of *fungus*, and κλαδος, a *branch.*

1. B. *fenestrále*, Ag. (*Window Byssocladium*). *Ag. Syst. Alg. p.* 31.—*Conferva fenestralis, Dillw. Conf. t.* 94.

On windows and damp glass, where it forms orbicular whitish spots.

79. Mycinéma. *Ag.* Mycinema.

Filaments membranaceous, opaque, tenacious, coloured.—Name, μυκης, a *fungus*, and νημα, a *thread.*—Decumbent, cobweb-like plants, growing on rotten wood; probably only imperfect *fungi.*

1. M. *arachnoidéum*, Ag. (*cobweb Mycinema*); filaments branched slender pale-yellow laxly interwoven into an arachnoid membrane, branches scattered remote simple, articulations variable about four times as long as broad.—*Ag. Syst. Alg. p.* 32.—*Conferva arachnoidea, Dillw. Conf. t. C.*

On rotten wood.

2. M. *fúlvum*, Ag. (*tawny Mycinema*); filaments decumbent elongated membranous equal branched, loosely interwoven into a soft expanded tawny stratum, articulations thrice as long as broad.—*Ag. Syst. Alg. p.* 33. *Loudon, Encycl. N.* 15061.

On dead trees, but I do not know where found.

3. M. *rubiginósum*, Ag. (*red Mycinema*); filaments much branched rigid suberect reddish interwoven into a subsolid

mass, articulations about four times as long as broad. — *Ag. Syst. Alg. p.* 33. — *Conferva rubiginosa, Dillw. Conf. t.* 68.

On rotten wood. *Dillw.*

4. M. *phosphóreum*, Ag. (*violet-blue Mycinema*); filaments branched ascending very short violet-blue densely interwoven into an uniform crust, articulations once and a half as long as broad. — *Ag. Syst. Alg. p.* 33. — *Conferva phosphorea, Dillw. Conf. t.* 88.—*Auricularia phosphorea, Sow. Fung. v. III. t.* 350.

On decaying wood.

80. Chroólepus. *Ag.* Chroolepus.

Filaments rigid, subsolid, opaque, falling to powder, erect, minute; joints often contracted.— Name, χροος, a *skin*, and λεπω, to *decorticate*; from the change which the filaments undergo.— Small as this genus is, it contains two distinct tribes; the *first*, or legitimate *Chroolepus*, is intermediate between *Protonema* and *Trentepohlia*; the *second* includes some minute objects which ought surely to be removed to the byssoid fungi, perhaps to the genera *Monilia* or *Helmisporium*. Mr. Arnott, indeed, is of opinion, with Fries, that the whole should form the modified genus *Byssus*, and be removed from the *Algæ*.

1. *Orange, red, or yellow, rarely greenish.* (Amphiconium, *Spr.*)

1. C. *aúreus*, (*orange Chroolepus*); filaments forming soft cushion-like tufts flexuose irregularly branched yellow-green or orange, articulations twice as long as broad. — *Trentepohlia aurea, Ag. Syst. Alg. p.* 36.—*Conferva aurea, Dillw. Conf. t.* 35. — *Byssus aurea, E. Bot. t.* 212. — *Ectocarpus aureus, Lyngb. Hydroph. Dan. t.* 44. —*Amphiconium aureum, Spr.* — *Conf. ilicicola, E. Bot. t.* 1639.

On rocks and trees, very common.—This forms beautiful velvetty cushions, of a chlorous, orange or brick-red colour, fading, after long keeping in the herbarium, to a dull ash-grey. I hope I shall not be accused of mischievously adding to the already numerous synonyms of this little plant, by removing it to the present genus, which I have done, from its very strong affinity to the four following species, (an affinity already pointed out by Fries)[1]; indeed, I am inclined to suspect, they are mere varieties, resulting from difference of locality. With neither *Trentepohlia pulchella* nor *purpurea*, has *C. aureus* any affinity.

2. C. *Jólithus*, Ag. (*orange-red Chroolepus*); filaments tufted erect very short orange-red dichotomous, articulations once and a half as long as broad. *Ag. Syst. Alg. p.* 34.

On rocks, in woods, &c.—Mr. Arnott suspects this to be only a state of *C. aureus*; in which I am inclined to agree with him.

3. C. *odorátus*, Ag. (*sweet-scented Chroolepus*); filaments branched tufted short erect fulvous, branches patent rigid,

[1] Syst. Orb. Veget. v. i. p. 309.

articulations as long as broad.—*Ag. Syst. Alg. p.* 35.—*Conferva odorata, Lyngb. Hydroph. Dan. t.* 57.—*Amphiconium Linnæi, Spr.*—*Johnst. Berw. Fl. v.* 2. *p.* 245.

On the bark of ash-trees. About Berwick, *Dr. Johnston.*—I cannot distinguish this from the following.

4. C. *lichenícolus*, Ag. (*parasitical Chroolepus*); tufts red-orange, filaments erect fasciculated alternately branched rigid, articulations slightly tumid as long as broad.—*Ag. Syst. Alg. p.* 35.—*Conf. lichenicola, E. Bot. t.* 1609. *Dillw. Syn. Conf. p.* 56.

On Lichens and old trees, not uncommon.

2. *Black, torulose; bearing clavate bodies resembling sporidia.* (Helmisporium?)

5. C. *ebénea*, Ag. (*black Chroolepus*); filaments branched erect tufted rigid subcartilaginous black obtuse, articulations as long as broad. *Ag. Syst. Alg. p.* 36.—*Conferva ebenea, Dillw. Conf. t.* 101.—*Byssus nigra, E. Bot. t.* 702.

On rocks and trees, in alpine districts.—"*Stratum* of indefinite extent, thin, velvetty-black. *Filaments* scarcely more than a line (or two) in length, interwoven, slightly branched, extremely fragile. Articulations about as broad as long, rather translucent. I have found specimens of this plant, bearing *pod-shaped branches* or *appendages*, thicker than the main filament, with the articulations twice as broad as long, and readily separating into single joints." *Carm. MSS.*—These *pod-shaped appendages* are surely of the same nature as what are called "*sporidia*" in the genus *Helmisporium* of Link; to which genus, the *black species* of *Chroolepus* ought, perhaps, to be removed.

6. C. *melæ'nus*, Carm. (*long-jointed black Chroolepus*); filaments slightly branched erect forming a jet-black stratum, articulations oval twice as long as broad, joints contracted.—*Syncollesia? melæna, Ag. Syst. Alg. p.* 32.—*Conferva melæna, Lyngb. Hydroph. Dan. t.* 57.

On old beech-trees at Appin, *Capt. Carmichael.*—"*Stratum* of several inches in diameter, of a deep velvetty black colour. *Filaments* about a line in length, slightly branched, exceedingly fragile; articulations about twice as long as broad, oval, moniliform, subdiaphanous." *Carm. MSS.*—Lyngbye's figure, though rude, is very characteristic. I do not see how this differs from *Monilia attenuata* (*Grev. Crypt. Fl. t.* 255.), except in being branched; the structure is precisely similar.

7. C. *mesómelas*, Carm. (*variegated Chroolepus*); "filaments slightly branched erect forming a jet-black stratum, articulations globose opaque, the uppermost pellucid." *Carm. MSS.*

On decaying stems of *Urtica dioica, Captain Carmichael.*—"*Stratum* half an inch in length, of a deep black colour. *Filaments* erect, slightly branched; branches divaricate, at the base, ascending. Articulations globular, moniliform, perfectly opaque, with the exception of one or two of the terminal ones. Siliquæform appendages scattered, as in *C. ebenea*." *Carm. MSS.*

8. C. *Arnóttii*, Hook. (*Mr. Arnott's Chroolepus*) ; filaments very short heaped together fragile moniliform slightly branched, branches simple subulate spine-like divaricate, articulations rather shorter than broad, joints contracted.

On Yews, at Cleish Castle, Kinross-shire, *Mr. Arnott.* — "This singular plant resembles none other that I know. It is found only on Yew-trees : these are of great age, and have, in general, near the root a very irregular outline, exhibiting deep cracks or clefts : from these fissures exudes the juice of the tree ; this soon afterwards thickens and becomes covered with a soft filamentous substance that might be mistaken for *Racodium cellare* or rather *R. vulgare, Fries*, if indeed it has not been frequently passed over for that plant. Such is its first state. The sap of the tree continues to flow through the plant, which also increases in size and thickness, at last becoming a firm corky almost hemisphærical substance, losing nearly all trace of the filamentous surface, and slightly resembling specimens of *Sphæria deusta ;* presenting like them, when broken, though generally very indistinctly, the appearance of concentric layers, which, from the observations I have made, mark pretty nearly the number of years the specimen has been in forming. This I have no doubt is caused by the inspissation, at the close of each season, of the sap of the tree absorbed by the parasite. I may add, that when well dried, this species takes fire very readily from a spark, and burns like tinder." *Arn. in litt.*

81. Trentepóhlia. *Ag.* Trentepohlia.

Filaments minute, tufted, erect, coloured, articulated ; dissepiments hyaline. *Fruit ;* tufted, terminal *capsules.* — Named in honour of a German botanist. — The species inhabit fresh water or marine rocks and caverns.

1. T. *purpúrea*, Ag. (*purple Trentepohlia*) ; filaments erect very minute forming continuous velvetty patches slightly branched, branches dichotomous, articulations twice as long as broad. — *Ag. Syst. Alg. p.* 36. — *Conferva purpurea, Dillw. Conf. t.* 43. — *Byssus purpurea, Lightf.* — *E. Bot. t.* 192.

On rocks and stones, near the sea. Icolumbkill, *Lightfoot.* Anglesea, *Rev. H. Davies.* In a cavern at Swansea, *Dillw.* Abundant in Fingal's cave, Staffa, *W. H. Harvey.* — This forms exceedingly thin undefined patches, of a dull purple colour, resembling a mere stain on the surface of the rock. The *filaments* are scarcely a line high and very sparingly branched. It has many points in common with *Callithamnion Rothii*, and I am almost inclined to think it may be that species, altered by growing in situations where it is only occasionally wet with salt water.

2. T. *pulchélla*, Ag. (*beautiful Trentepohlia*) ; filaments virgate tufted much branched, branches erect alternate beset with short opposite or secund ramuli, articulations four times as long as broad, capsules racemose. — *Ag. Syst. Alg. p.* 37. — *Conferva nana, Dillw. Conf. t.* 30. (*according to authentic specimens*). *E. Bot. t.* 2585. — β. *chalybea, Ag.* — *Conf. chalybea, Dillw. Conf. t.* 91. — *C. corymbifera, E. Bot. t.* 1666. *f.* 1.

In mountain-streams ; growing on the naked rock, or on aquatic mosses, &c. — *Filaments* one-eighth to one-half of an inch long ; forming

fine tufts or continuous strata, much branched; branches very erect, almost appressed, long and virgate, more or less furnished with short ramuli. —*Colour*, in *α*. rose or blood-red; in *β*. dull bluish grey. *Capsules* very minute, tufted on the lower ramuli. A most beautiful plant, a good deal resembling *Calithamnion virgatulum*, under the microscope, and very similar in structure: *β*. is smaller and less branched; but there are insensible gradations. — Mr. Arnott informs me, that a specimen in his possession, from Dillwyn, proves the *Conf. nana* of that author to be identical with the present.

82. Protonéma. *Ag.* Protonema.

Filaments subarticulated, branched, rooting, mostly green. — Name, πρωτος, *first*, or primary, and νημα, a *thread*. — The following obscure productions are probably rudimentary mosses. — *P. velutinum*, Ag. (the well known *Byssus velutina*) having been *proved* to be merely the commencement of *Polytrichum aloides*, I have omitted.

1. P. *umbrósum*, Ag. (*shaded Protonema*); stratum velvetty green, filaments erect obtuse fastigiate fragile, articulations gibbous. — *Ag. Syst. Alg. p.* 43. — *Conferva umbrosa, Dillw. Conf. t.* 61.

On damp ground.

2. P. *cryptárum*, Ag. (*Cave Protonema*); filaments dichotomous green, branches divaricating, acuminated, articulations thrice as long as broad. — *Ag. Syst. Alg. p.* 44. — *Conferva cryptarum, Dillw. Conf. Syn. t. D. E. Bot. t.* 2588.

In caves, first observed by *R. Brown, Esq.* — Agardh suspects this may be the young of some *Phascum*.

3. P. *Achárii*, Ag. (*Acharian Protonema*); filaments brownish-green branched erect, articulations twice or thrice as long as broad, joints contracted. — *Ag. Syst. Alg. p.* 44. — *Conferva Acharii, Dillw. Conf. t.* 69.

On damp shady banks.

4. P. *Orthótrichi*, Ag. (*parasitical Protonema*); filaments olivaceous minute branched obtuse erect, articulations about as long as broad. — *Ag. Syst. Alg. p.* 44. — *Conferva Orthotrichi, Dillw. Conf. t.* 89. — *C. muscicola, E. Bot. t.* 1638.

On the leaves and stems of various *Orthotricha*; common.

5. P. *muscícola*, Ag. (*chestnut-coloured Protonema*); filaments brown branched, branches alternate divaricate subulate, articulations thrice as long as broad. — *Ag. Syst. Alg. p.* 45. — *Conferva castanea, Dillw. Conf. Syn. p.* 72. *E. Bot. t.* 1701. — *C. muscicola, Web. et Mohr.*

In shady places, among mosses.

83. Hygrocrócis. *Ag.* Hygrocrocis.

Filaments hyaline, interwoven into an uniform membrane or gelatine. — Name; ὑγρος, *belonging to water*, and, κροκις, a *little*

tuft.—Obscure byssoid productions, found in chemical solutions and various infusions.

1. H. *barýtica*, Ag. (*barytica Hygrocrocis*); tufts globose, filaments very slender arachnoid hyaline densely interwoven inarticulate flexuose branched, branches divaricating. — *Ag. Syst. Alg. p.* 45. *Loudon, Encycl. N.* 15087.
In a solution of muriate of Barytes.

2. H. *Atraménti*, Ag. (*Ink Hygrocrocis*); filaments dichotomously branched minute decumbent densely interwoven in a white stratum, articulations longer than broad. — *Ag. Syst. Alg. p.* 45. — *Conferva Atramenti, Lyngb. Hydroph. Dan. t.* 57.
On the surface of ink: very common.

3. H. *typhlodérma*, Ag. (*skin-like Hygrocrocis*); filaments slightly branched densely interwoven in an olivaceous pellicle, articulations as long as broad.—*Ag. Syst. Alg. p.* 46.—*Conferva typhloderma, Dillw. Conf. t.* 83.
In water containing a solution of Gum-Dragon, *Mr. W. W. Young.*

4. H. *pállida*, Ag. (*pale Hygrocrocis*); filaments dichotomous curvato-flexuose fastigiate ochraceous interwoven in a gelatinous coriaceous pellicle, axils rounded, articulations very long. *Ag. Syst. Alg. p.* 46.—*Conferva pallida, Dillw. Conf. t.* 78.
" My friend *Mr. W. W. Young*, having let some yellow ochre remain about a fortnight in a pot of isinglass size, found the surface of the ochre nearly covered by the present minute and interesting Conferva." *Dillw.*

5. H. *Rósæ*, Ag. (*Rose-water Hygrocrocis*); filaments hyaline slightly branched interwoven into a cloud-like olive-gray bullated membrane or compact dull-gray gelatine. — *Ag. Syst. Alg. p.* 46.
In distilled rose-water; *Miss Trevelyan.*

6. H. *sanguínea*, Ag. (*red Hygrocrocis*); filaments branched densely interwoven in a blood-red gelatinous pellicle, branches divaricate, articulations rather longer than broad. — *Ag. Syst. Alg. p.* 46. — *Conferva sanguinea, Dillw. Conf. Syn. p.* 55.
" Mr. Young discovered the present species, forming a densely matted membrane on the surface of some isinglass size, in which he had put some patent yellow to dissolve; but we have since repeatedly endeavoured to produce it in the same manner, without success." *Dillw.*

7. H. *Víni*, Ag. (*brownish-yellow Hygrocrocis*); brownish-yellow, filaments hyaline interwoven much branched, branches attenuate acute, articulations twice as long as broad. — *Ag. Syst. Alg. p.* 47. *Loudon, Encycl. N.* 15093.
In Madeira wine.

84. Leptómitus. *Ag.* Leptomitus.

Filaments hyaline, erect, parasitical, growing in fresh-water or in the sea.—Name: λεπτος, *slender*, and μιτος, a *thread.*

1. L. *minutíssimus*, Ag. (*minute Leptomitus*); filaments slightly branched very minute hyaline, branches scattered forked obtuse, joints obsolete, articulations variable.—*Ag. Syst. Alg. p.* 47.—*Conferva minutissima, Dillw. Conf. Suppl. t. F.*

On *Confervæ*, in the sea, *Dillwyn.*—I admit this, merely to state my belief that it is nothing more than the "*fibrillæ*," so often found besetting the apices of the filaments of the *Polysiphoniæ.*

2. L. *lácteus*, Ag. (*white Leptomitus*); "filaments branched clustered in a shapeless gelatinous mass dirty-white, branches from each dissepiment, articulations very long."—*Ag. Syst. Alg. p.* 48.—*Conferva lactea, Dillw. Conf. t.* 79.

In ditches and rivulets; growing on stones, wood, &c. *Dillwyn.*

3. L. *clavátus*, Ag. (*club-shaped Leptomitus*); "filaments simple hyaline, apex clavate."—*Ag. Syst. Alg. p.* 49.—*Vaucheria aquatica, Lyngb. Hydroph. Dan. t.* 22.

On fishes and dead flies, *Agardh.*—The habitat of this production proves that it is no Alga.

Div. III. GLOIOCLADEÆ.[1]

Plants consisting of numerous globules, or filaments invested with a definite gelatine and forming globose or filiform fronds.

Tribe XIX. Batrachospermeæ.

Plants filiform or globose, composed of articulated, branched filaments, invested with gelatine. Fructification, so far as it is known, capsules on the ultimate ramuli.—Marine or in fresh-water.

85. Mesogloía. *Ag.* Mesogloia.

Frond filiform, solid (very rarely tubular); the axis gelatinous or somewhat fibrous; the periphery formed of radiating articulated coloured subdichotomous filaments. *Fructification; globules* of *seeds*, seated in the dichotomies of the ultimate ramuli, composing the periphery.—Name; μεσος, *the middle*, and γλοιος, *viscid*, from the gelatinous axis.

1. *Purple or rose-red.*

1. M. *multífida*, Ag. (*dichotomous Mesogloia*); frond dichotomous elastic, the axils rounded.—*Ag. Syst. Alg. p.* 50.—*Chætophora multifida, Ag.—Hook. Scot.*

On shells and stones, near low-water mark, not rare. Appin, *Captain Carmichael.* Malbay and Killiney, Ireland, *W. H. Harvey.*—3—6 inches long, 1—2 lines in diameter, gelatinoso-cartilaginous, very elastic, sparingly dichotomous, the axils remarkably rounded; colour a dull purplish-brown.

2. M. *Hudsóni*, Ag. (*Hudson's Mesogloia*); frond much branched filiform, branches pinnate opposite, ramuli numerous

[1] By W. H. Harvey, Esq.

irregular obtuse.—*Ag. Syst. Alg. p.* 50.—*but not Ulva rubra, Huds.*

Portland Island and near Poole, Dorset, *Hudson.* Devonshire, *Mrs. Griffiths.* Bantry Bay, *Miss Hutchins.* Lossiemouth, *Mr. Brodie.*—*Frond* excessively branched, slender, filiform; the branches short, patent, gradually shortening upwards, so as to form a lanceolate outline: *ramuli* abundant, 1—4 lines long, divaricato-patent, obtuse, substance tender, gelatinous; colour pale-red. "The structure is very remarkable: the *frond* appears to be made up of tufts of fibres, radiating from a centre, each tuft, when separated in water under a glass, resembling a double Aster or sea Anemone. In the centre of the petal-like fibres are masses of purplish grains." *Mrs. Griffiths in litt.*—My friend, G. A. W. Arnott, Esq., has favoured me with the following note on this species. "Agardh has most erroneously referred to *Ulva rubra* Huds. as the type of this species; of that, however, the *E. Bot.* figure is a sufficiently accurate representation; and I am confirmed in this opinion, by a specimen which is in the late Mr. Brodie's herbarium, now belonging to me, which was given by Sir T. Frankland to Mr. Brodie, and declared by him to be Hudson's plant. Now the *U. rubra*, Huds. and E. Bot., is a mere state of *Halymenia ligulata.*—At one time, I was inclined to suspect that Agardh had in view not *U. rubra*, but *U. rubens*, Huds.; but a specimen from Sir. T. Frankland in Brodie's herbarium, proves that almost forgotten species to be *Mesogloia vermicularis.* Ag."

3. M. *purpúrea*, Harv. (*purple Mesogloia*); frond attenuated at base, branches distichous linear-fusiform elongated simple nearly bare of ramuli.

Sidmouth, *Mrs. Griffiths.*—1—2 feet high, robust, deep purple-red, staining fresh-water pink. *Stem* subsimple, irregularly branched; *branches* subalternate, distichous, long, simple, patent, constricted at the base, attenuated to a fine point. "*Substance* tender, gelatinous and slippery to the touch, not so elastic as *M. vermicularis.*" *Mrs. Griffiths in litt.*

4. M. *coccínea*, Ag. (*moniliform rose-red Mesogloia*); frond much branched, branches moniliform irregularly dichotomous attenuated, ramuli numerous crowded round the apex subattenuate.—*Ag. Syst. Alg. p.* 51.—*Rivularia verticillata, E. Bot. t.* 2466.

Southern coasts of England and Ireland, very rare. Brighton, *Mr. Borrer.* Bantry Bay, *Miss Hutchins.* Sidmouth, *Mrs. Griffiths* and *Miss Cutler.*—2—6 inches high, fine rose-red, very gelatinous and delicate. The branches and ramuli are moniliform, in consequence of the whorls of filaments forming the periphery being sub-distant.

5. M.? *capilláris*, Ag. (*capillary rose-red Mesogloia*); frond tubular, branches opposite attenuated at base, ramuli short very slender alternate flexuose subulate.—*Ag. Syst. Alg. p.* 51.—*Fucus capillaris, Turn. Hist. Fuc. t.* 31.—*Gloiosiphonia capillaris, Carm. MSS.* (*cum ic. eximia*).

South coasts of England, *Mrs. Griffiths.* Bantry Bay, *Miss Hutchins.* Appin, extremely rare, *Capt. Carmichael.*—5—6 inches high, much branched; main *filaments* often a line in diameter; branches and ramuli very slender and flexuose.

2. *Olive-green.*

6. M. *vermiculáris*, Ag. (*Worm-like Mesogloia*); branches irregularly pinnate thick vermicular linear-fusiform, ramuli copious elongated flexuose resembling the branches.—*Ag. Syst. Alg. p.* 51.—*Rivularia vermiculata, E. Bot. t.* 1818.—*Ulva rubens, Huds. Fl. Angl. p.* 571. (*according to Mr. Arnott.*)

Coasts of England, Scotland, and Ireland, in many places, common.—1—2 feet high, the branches widely spreading, 1—2 lines broad, clumsy, flexuose and attenuated towards each end. Substance firmly gelatinous or sub-cartilaginous, elastic. "Whether we consider the character" *U. gelatinosa filiformis ramosissima rubescens, ramis sparsis horizontalibus obtusis*, "given by Hudson to his *U. rubens*, or rely on the specimen I possess from Sir T. Frankland in Mr. Brodie's herbarium, and compared with Hudson's plant, there can be no doubt but that species must be referred to *M. vermicularis*." Arn.

7. M. *Griffithsiána*, Grev. MSS. (*Mrs. Griffiths' Mesogloia*); branches alternate or irregular very slender filiform long simple nearly bare of ramuli.

Sidmouth, *Mrs. Griffiths.*—8—16 inches high, of a pale rather olive green, which becomes greener in fresh-water: *frond* subsimple, beset throughout with very long, slender, simple, opposite or alternate *branches*, its surface covered with long colourless byssoid fibres, similar to what occur in *Chordaria flagelliformis*. "Many fronds grow from the same base, waving most beautifully in the water; and the long radiating fibres make the plant appear much larger than it really is." *Mrs. Griffiths in litt.*—The habit of this species is decidedly that of *Chordaria flagelliformis;* a plant which Mrs. Griffiths considers generically allied to *Mesogloia;* in which opinion I fully coincide, although I know I stand opposed to my friend Dr. Greville and the bulk of Algologists.

8. M. *viréscens*, Carm. (*greenish villous Mesogloia*); branches long erecto-patent filiform villose, ramuli numerous patent short flexuose obtuse.

Appin, *Capt. Carmichael.* Sidmouth, *Mrs. Griffiths.*—8—12 inches high, olive-green, tender, gelatinous, slippery, excessively branched; branches long, simple or forked, furnished with numerous alternate or secund, divaricating, flexuose ramuli. *Frond* to the naked eye appearing villose, owing to the filaments composing the periphery being very much protruded beyond the gelatine, and accompanied also by hyaline fibres, similar to those of *M. Griffithsiana.*

86. BATRACHOSPÉRMUM. *Roth.* Batrachospermum.

Main filaments invested with gelatine, hyaline, tubular, longitudinally striated, composed of colourless jointed fibres agglutinated together, beset with distant whorls of moniliform ramuli. *Fructification; globules* of *seeds* seated in the whorls.—Name; βατραχος, a *frog*, and σπερμα, *frog-spawn*,—which the species much resemble.—"In this genus the stem and primary branches of the frond are made up of a bundle of confervoid fibres, agglutinated together; while the ultimate branches, as well as the

whorled ramuli, consist of a single tube. The articulation of the former is also probably spurious and merely a darkening or intumescence, caused by the egress of so many ramuli from the same point. This structure brings it so near to *Mesogloia*, that no essential difference remains, excepting in the disposition of the radiating branchlets." *Carm. MSS.*

1. B. *vágum*, Ag. (*cylindrical Batrachospermum*); frond subdichotomous cylindrical equal, apices of the branches incrassated.—*Ag. Syst. Alg. p.* 52. *Lyng. Hydroph. Dan. t.* 64.

In alpine bogs and lakes, common.—Varying in colour from dull-green to bright æruginose or even blue.

2. B. *monilifórme*, Ag. (*moniliform Batrachospermum*); irregularly branched, branches moniliform, apices attenuated.—*Ag. Syst. Alg. p.* 53.—*Conf. gelatinosa, Dillw. Conf. t.* 32. *E. Bot. t.* 689.—*β. detersum, Ag.*—*Conf. atra, Dillw. Conf. t.* 11. *E. Bot. t.* 690.

In subalpine streamlets.—Scarcely differing from the former, except by its rather more distant whorls. Colour varying from grayish-green to black, occasionally changing to purple in drying. Capt. Carmichael found an extraordinary plant at Appin, which he considered a distinct species, and called *B. proliferum;* but it is probably only a *variety* of the present. He thus describes it: "*Fronds* solitary, or in small clusters, 1—2 inches long, irregularly branched; *branches* divaricate, curved or flexuose, opaque and very dark-coloured, beset with short ramuli, which issue out from the joints among the whorls of eccentric filaments, and are themselves beset with whorls: colour gray." *Carm. MSS.*

87. Draparnáldia. *Bory.* Draparnaldia.

Frond diorganous; main *filaments* gelatinous, hyaline, emitting, at the joints, pencils of coloured ramuli.—Named in honour of *J. P. R. Draparnaud*, a French Botanist and Algologist.—This beautiful genus is closely related to *Chætophora*, from which it differs in the absence of a firm gelatine and confervoid habit.

1. D. *plumósa*, Ag. (*feathery Draparnaldia*); pencils of branches linear-lanceolate acute.—*Ag. Syst. Alg. p.* 58.—*Conf. lubrica, E. Bot. t.* 2087.

In streamlets and wells, frequent.

2. D. *glomeráta*, Ag. (*clustered Draparnaldia*); pencils of branches ovate obtuse patent.—*Ag. Syst. Alg. p.* 58.—*Conf. mutabilis, Dillw. Conf. t.* 12. *E. Bot. t.* 1746.

In streamlets and wells, frequent.—It scarcely differs specifically from the former.

3. D. *ténuis*, Ag. (*slender Draparnaldia*); ramuli simple subfasciculate, primary filament partially coloured.—*Ag. Syst. Alg. p.* 57.—*Conf. lubrica, Dillw. Conf. t.* 57.—*C. protensa, Dillw. Conf. t.* 67. and *C. exigua, t. D.* (*status junior*).

In rivulets.—But for its definite gelatine, this species would not differ from *Conferva*.

88. CHÆTÓPHORA. *Ag.* Chætophora.

Frond gelatinous, globose, or lobed, rarely plane and crustaceous, composed of numerous filaments aggregated together and issuing from a common base. *Filaments* articulated, branched; articulations of the branches subhyaline, those of the ramuli coloured.—Name; χαιτη, a *bristle*, and φορεω, to *bear*; the ramuli are, in some stage of growth, tipped with long setaceous points or bristles.

1. *In fresh-water.* (Chætophoræ genuinæ.)

1. C. *endiviæfólia*, Ag. (*branching Chætophora*); frond elongated filiform somewhat compressed subdichotomously branched.—*Ag. Syst. Alg. p.* 28—*Ulva incrassata*, *E. Bot. t.* 967.

In lakes and streams, frequent.—A beautiful object under the microscope, and interesting, as it connects this genus with *Draparnaldia*.

2. C. *tuberculósa*, Hook. (*tubercular Chætophora*); frond at first globose and firm afterwards much lobed fragile and hollow, filaments very slender flexuose hyaline, ramuli coloured palmato-fasciculate.—*Hook. Scot. II. p.* 76.—*C. pisiformis*, *β. tuberculosa*, *Ag. Syst. Alg. p.* 27.—*Rivularia tuberculosa*, *E. Bot. t.* 2366.

In boggy pools.

3. C. *élegans*, Ag. (*elegant Chætophora*); "frond subglobose gelatinous solid green, filaments subdichotomous, ramuli fastigiate attenuate the apices produced beyond the gelatine." *Carm.*—*Ag. Syst. Alg. p.* 27.

In stagnant pools.

4. C. *pisifórmis*, Ag. (*small globose Chætophora*); "frond subglobose fleshy green, filaments subdichotomous obtuse, sporidia globose axillary." *Carm.*—*Ag. Syst. Alg. p.* 27. *Berk. Alg. t.* 1. *f.* 1.—*C. elegans*, *Lyngb. Hydroph. Dan. t.* 65. *Grev. Crypt. Fl. t.* 150.

In subalpine lakes.—"*Sporidia* globular, green, scattered among the upper branches of the filaments." *Carm. MSS.* Similar fruit is figured by the *Rev. M. J. Berkeley*, in the first number of his "Gleanings of British Algæ."

5. C. *longæ'va*, Carm. (*elongated Chætophora*); "frond indefinitely effused incrusting gelatinous green, filaments subdichotomous, ramuli produced proliferous towards the apex." *Carm.*

In a boggy streamlet at Appin, *Capt. Carmichael.*—"*Fronds* continuous, or so closely set as to have that appearance, of a delicate green colour, and more flaccid than those of *C. elegans*, apparently from a de-

ficiency of gelatine; *filaments*, in all respects, similar to those of the other species, except in being mostly proliferous." *Carm. MSS.*

2. *Marine.* (Chætophoræ spuriæ.)

6. C. *Berkeléyi*, Grev. (*Mr. Berkeley's Chætophora*); "frond depressed brown subhemisphærical, main branches somewhat anastomosing, ultimate ones fasciculate." *Berk. Alg. t.* 1. *f.* 2.

Rocks at Torquay, *Rev. M. J. Berkeley.*

7. C. *pellíta*, Lyngb. (*purple crustaceous Chætophora*); frond purple-brown crustaceous gelatinoso-coriaceous indefinitely spreading.—*Lyngb. Hydroph. Dan. t.* 66. *Fl. Dan. t.* 1728. *f.* 1. *Berk. Alg. t.* 1. *f.* 3.

Rocks and stones, in the sea. Appin, *Captain Carmichael.* Oban, *Rev. M. J. Berkeley.* Miltown Malbay, *W. H. Harvey.*—"*Sporidia* between obovate and clavate, lodged at the base of the filaments. On being disengaged, they separate, as in some of the *Fuci*, into 3—4 roundish portions" *Carm. MSS.* This fructification appears to be of rare occurrence. It was not till after an examination of more than 100 specimens, that Captain Carmichael was fortunate enough to discover it, in the month of February.

89. Corynéphora. *Ag.* Corynephora.

Frond globose or lobed, carnoso-coriaceous, hollow (not filled with gelatine), composed of articulated dichotomous *filaments*, fasciculated at the apices, and issuing from a central point. *Fructification;* oval *capsules* or *globules* of *seeds*, seated in the terminal fasciculi.—Name; κορυνη, a *club*, and φορεω, to *bear;* the *apices* of the filaments are agglutinated into the tough frond or periphery and are clavate.—Closely related to *Mesogloia*, (especially *M. vermicularis*), but differing in the absence of a filiform axis.

1. C. *marína*, Ag. (*marine Corynephora*). *Ag. Syst. Alg. p.* 24.—*Tremella difformis, Linn.*—*Chætophora marina, Lyngb. Hydroph. Dan. t.* 66. *Grev. Crypt. Fl. t.* 25.—*Rivularia tuberiformis, E. Bot. t.* 1956.

In the sea, on rocks, corallines and *Algæ*, abundantly.—"In young plants, the central cavity is traversed by a system of very wide inflated jointed hyaline tubes, branching dichotomously, while they radiate in all directions to the surface, where each branch terminates in a tuft of short, club-shaped, moniliform, coloured ramuli; among these last, which by their lateral cohesion form the whole substance of the plant, the *sporidia* are found nestling. They are obovate, smooth, and mostly solitary." *Carm. MSS.*—Common as this plant is on our shores, we have no correct figure or description of it in any British work. The above is from the manuscripts of the late Captain Carmichael, and it is the best and most perspicuous that I know.

90. Myrionéma. *Grev.* Myrionema.

Mass gelatinous, effused, composed of very short, clavate, erect, mostly simple *filaments*, "fixed at their base to a thin

expansion" (Grev.). *Fruit: capsules* at the base among the filaments.—Name; *μυριος, a thousand,* and *νημα,* a *filament;* from the innumerable filaments which unite to form the frond.—A genus of extremely minute parasites, which it was Capt. Carmichael's wish to have called "Linkia." The "thin expansion," described by Greville, I am inclined to suspect, may be only the excoriated epidermis of the *Ulva* on which the parasite grew.

1. M. *strángulans,* Grev. (*convex Myrionema*); "subconvex confluent, filaments subcylindrical simple, capsules shortly pedicellated "affixed to the basal lamina." *Grev. Crypt. Fl. t.* 300.

On various *Ulvæ.*—1—2 lines in diameter, brown.

2. M. *punctifórme,* Harv. (*plane Myrionema*); very minute plane scattered, filaments attenuate at the base simple, capsules sessile affixed to the filaments.—*Linkia punctiformis, Lyngb. Hydroph. t.* 66.—*Carm. MSS. cum icone.*

On *Chylocladia clavellosa, Captain Carmichael.*—Half a line in diameter.

3. M. *clavátum,* Harv. (*clavate Myrionema*); very minute rather convex, filaments clavate mostly bifid, capsules pedicellate affixed to the filaments.—*Linkia clavata, Carm. MSS. cum icone.*

"On a thin purplish crust, which covers the pebbles at the half-tide level.—The parasite is so much of the colour of the crust, that it requires a microscope to detect it." *Captain Carmichael.*

Tribe XX. Rivularieæ.

Plants more or less globose, never filiform, carnose, composed of continuous filaments annulated within.

91. Rivulária. *Roth.* Rivularia.

Frond globose or lobed, rarely incrusting, green or olivaceous, carnose or gelatinous, composed of continuous filaments annulated within, and surrounded by or set in gelatine.—Named in allusion to the fresh-water habitat of some of the original species:—many, however, are found in the sea.—This genus contains three natural groupes or sub-genera, corresponding with the following sections.

Sect. 1. (Rivularia, Roth.—Linkia, Lyngb.): *frond verrucæform, rarely incrusting. Filaments close-set, sparingly annulated within, (mostly) dichotomously branched, radiating from a common fixed base.*

1. R. *átra,* Roth, (*black Rivularia*); fronds minute scattered globose smooth firm glossy-black, filaments deep-green slender dichotomous.—*Ag. Syst. Alg. p.* 24. *E. Bot. t.* 1798.

On marine rocks, plants, &c., very common.

2. R. *botryoides*, Carm. (*grape-like Rivularia*); fronds minute aggregated roundish wrinkled ferruginous cartilaginous, filaments dichotomous.

In streamlets, attached to rocks and stones, *Captain Carmichael.*— "*Fronds* about a line in diameter, hemispherical, wrinkled and cartilaginous, scattered or running together like a bunch of grapes. *Filaments* cohering firmly, obscurely striated, dichotomous. *Colour*, when fresh, black; on drying, darkly ferruginous." *Carm. MSS.*

3. R. *Pisum*, Ag. (*sphærical Rivularia*); frond globose smooth soft shining dark-green, filaments dichotomous.—*Ag. Syst. Alg. p.* 25. *Berk. Alg. t.* 2. *f.* 2.—*Linkia dura*, *Lyngb. Hydroph. Dan. t.* 67. *Grev. Crypt. Edin.* (*according to Mr. Arnott.*)

On aquatic plants, in subalpine streamlets.—"*Fronds* a line in diameter, scattered or confluent, of a dark-green colour and fleshy firmness. *Filaments* radiating from the base, dichotomously branched and attenuated to a point; striæ inconspicuous." *Carm. MSS.*

4. R. *applanáta*, Carm. (*flattened Rivularia*); fronds minute gregarious orbicular depressed black, filaments simple attenuate the apices free.

On rocks and stones, in the sea, common. Appin, *Capt. Carmichael.*— "*Fronds* a line in diameter, gregarious, often confluent, circular, depressed, spongy, of an opaque black colour, shrinking, splitting and becoming grayish on drying. *Filaments* one-fourth of a line in length, simple, attenuated to a point, loose at the apex, of a bluish-green colour." *Carm. MSS.*—This minute plant is probably common on every rocky coast, though hitherto overlooked. It differs from *R. atra* in its depressed form, and simple filaments.

5. R. *plicáta*, Carm. (*wrinkled Rivularia*); fronds rather large densely gregarious gelatinous compresso-plicate often hollow and ruptured dark-green, filaments many times dichotomous attenuated.

On the sea-shore about high-water mark, or in situations where it is only occasionally inundated with salt-water. Appin, *Captain Carmichael.* Torbay, *Mrs. Griffiths.* Eyemouth, *Dr. Johnston.* Innischerig Island, Clare, *W. H. Harvey.*—*Fronds* growing from a smooth gelatinous stratum, from a line to half an inch in diameter, mostly confluent and distorted by mutual pressure, gelatinous, and in their more advanced state often hollow and ruptured. *Filaments* dichotomous, tapering to a fine point, abscurely striated. *Globules* few in number, pellucid, lodged within the filaments, which at length break off, leaving the globule attached to the base of the dismembered branch.

6. R. *calcárea*, Sm. (*stony Rivularia*); fronds large orbicular convex, at length aggregated into a broad spongy crust, zoned within, at length petrified.—*E. Bot. t.* 1799. *Ag. Syst. Alg. p.* 26.—*R. hæmatites, Dec. and Duby*, (*according to Mr. Arnott.*) *Ag. Syst. Alg. p.* 26.—"*Oscillatoria torpens, Bory*" (*Arnott, MSS.*).

On rocks and stones, in streamlets and the borders of subalpine lakes.—" *Fronds* one-fourth or half an inch in diameter, circular, slightly convex, sometimes greenish but oftener of a dark chestnut colour. After a time they run together into a flat spongy crust of indefinite size. On the smooth face of a rock, exposed to the trickling of water, I found a connected sheet of it, upwards of a foot in diameter. When broken, the crust appears zoned within, so as to indicate the age of the plant, each zone being equal to a year's growth. At this stage, it is always more or less stony, from the absorption of calcareous matter." *Carm. MSS.*

7. R. *granulífera*, Carm. (*granuliferous Rivularia*); frond large convex becoming hollow underneath fleshy lubricous brownish-olive, often including stony particles, (never petrified.) —*Linkia dura*, γ. *crustacea*, *Lyngb. Hydroph. Dan. p.* 197?

On cliffs exposed to the trickling of water, common. " Annual," *Capt. Carmichael.*—" *Fronds* from a line to half an inch in diameter, often confluent, convex and at length concave underneath, fleshy, dusky, olive-green and extremely slippery. *Filaments* rather thick, repeatedly dichotomous. In the substance are generally enclosed a number of stony particles. This species comes nearest in size and form to *R. calcarea;* but is never, like that, petrified with calcareous matter; the *filaments* are also much thicker and more decidedly branched; and it is moreover an annual plant, whereas the other exists for several years." *Carm. MSS.*

8. R. *crustácea*, Carm. (*incrusting Rivularia*); crust very thin widely spreading, filaments attenuated at the base fastigiately branched above the middle olive-green.

" On rocks, exposed to the spray of cascades in the hill-streamlets," *Capt. Carmichael.*—" *Crust* of no determinate extent, extremely thin and slimy, black. *Filaments* one-fourth of a line in length, attenuated at the base, fastigiately branched above the middle, of an olive-green colour." *Carm. MSS.*

Sect. 2. (Scytochloria, Harv.): *frond gelatinoso-coriaceous, lobed and bullated or incrusting. Filaments close, densely and conspicuously annulated, set in a firm gelatine and pointing towards the periphery* (*not radiating*).

9. R. *nítida*, Ag. (*shining bullated Rivularia*); frond large gelatinoso-coriaceous lobed and plaited often bullated lubricous shining deep-green, filaments simple or pseudo-branched.—*Ag. Syst. Alg. p.* 25.—*Scytochloria nitida*, *Harv. MSS.*—*Rivularia bullata*, *Berk. Alg. t.* 2. *f.* 1.

On rocks, in the sea. Torquay, *Mrs. Griffiths.* Milton Malbay, *W. H. Harvey.*— *Fronds* subfoliaceous, tremelloid, tufted or gregarious, much lobed, the lobes sinuous in a young state, compressed, and filled with gelatine; in age becoming bullated and hollow; from half an inch to an inch and half in diameter. *Colour* a deep but very vivid olive-green, lubricous and subgelatinous to the touch. *Substance* firm, elastic, not easily lacerated. *Filaments* either simple or pseudo-branched, subtortuous, laxly set in the interior of the lobe, but closely agglutinated together on the exterior; and yet even there they are perfectly distinct

from each other, being separated by the firm gelatine, as may at once be perceived by viewing a portion of a lobe vertically, when they appear like points, bristling over the hyaline substance of the frond. Striæ closely set and conspicuous.

10. R. *plána*, Harv. (*green crustaceous Rivularia*); frond crustaceous plane widely spreading dull-green lubricous darker towards the centre.—*Chætophora plana, Ag. Syst. Alg. p.* 28? —*Scytochloria plana, Harv. MSS.*

On marine rocks, Miltown Malbay, *W. H. Harvey.*—*Fronds* crustaceous, spreading in suborbicular or irregular patches of indefinite extent, from one inch to two feet or more in diameter, of a dull green colour, towards the edges, but darker in the centre, with more or less of a nigrescent or deep olive cast; smooth, lubricous, gelatinous, fragile, easily torn, sub-transparent. *Filaments* erect, straight, tufted, pale-green, simple or very sparingly pseudo-branched; striæ tolerably evident close.

Sect. 3. (Raphidia, Carm.): *frond gelatinous, subglobose, bullated. Filaments few (compared with the quantity of gelatine) subulate, moniliform within, scattered through the gelatine or radiating from a central point.*

11. R. *angulósa*, Roth, (*plum-like Rivularia*); fronds gregarious roundish gelatinous hollow, filaments distant simple subulate moniliform within.—*Ag. Syst. Alg. p.* 25.—*Linkia natans, Lyngb. Hydroph. Dan. t.* 67.—*Raphidia natans, Carm. MSS.*—*Ulva pruniformis, E. Bot. t.* 968.

Attached to water-plants, in ponds and still waters.—"*Fronds* gregarious, often confluent, one-fourth to three-fourths of an inch in diameter, roundish, gelatinous, vesicular and when detached rising to the surface of the water with the velocity of an air-bubble. *Filaments* at the distance of 4—5 diameters from each other, radiating in all directions, from the centre of the vesicle; rising from a colourless globule, inflated for about one-third of their length, thence tapering to a long, slender, often curved point. Internal mass moniliform, occupying about one-half the diameter of the inflated part of the filament. *Colour* pale chestnut, inclining to olive." *Carm.*

Tribe XXI. Nostochineæ.

Plants more or less globose, gelatinous or carnose, including granules scattered through them or arranged in moniliform series.

92. Protocóccus. *Ag.* Protococcus.

Globules aggregated, naked, containing granules, sessile upon a transparent gelatinous mass. *Grev.*—Name; πρωτος, *first* or primary and κοκκος, *fruit;* alluding to the simplicity of its organization.—Agardh states that the globules of his *Protococcus* are perfectly *simple* or consisting merely of a hyaline pericarp, inclosing an uniform coloured mass, and he considers our British plant to be a different species, belonging to the

genus *Hæmatococcus*. Having minutely examined a specimen from Agardh himself, submitted to me for that purpose by Dr. Greville, and finding exactly the same compound structure as in our British specimens, I do not hesitate to pronounce the two plants identical.

1. P. *nivális*, Ag. (*crimson Protococcus or Red-Snow*); "globules exactly sphærical very minute fine purple-red, gelatinous mass pale spreading." *Grev. Crypt. Fl. t.* 231. (*admirable*).—*Ag. Syst. Alg. p.* 13, *et Ic. Alg. Europ. t.* 21.—*Hæmatococcus Grevillii, Ag. Ic. Alg. Europ. t.* 23.—*Palmella nivalis, Hook. in Parr. 2d Voy. App.*—*Uredo nivalis, Bauer.*

"On the borders of the lakes of Lismore, spreading over decaying leaves, &c.; but in greater perfection on the calcareous rocks, within the reach of occasional inundation." *Captain Carmichael.* Near Miltown Malbay, on schist; at Limerick, on limestone; and about Dublin, on granite; in most cases slightly inundated, *W. H. Harvey.*—This curious little plant, which, under the name of Red Snow, has excited no inconsiderable interest among the greatest botanists of the age, is usually found in this country in the form of a thin, stain-like stratum, on the surface of rocks or investing decayed vegetable substances with a purple crust. It was brought by Captain Ross from the Arctic regions, where it was observed covering the surface of the snow, in patches of many miles in extent, and penetrating in some places to the depth of twelve feet. It has likewise been found to occur commonly, on most of the mountains of Europe, in similar situations.

93. Hæmatocóccus. *Ag.* Hæmatococcus.

Globules naked, containing granules, aggregated into a frustulose crust.—Name; *αἷμα, blood,* and *κοκκος*, the *fruit;* many of the species are of a red colour.

1. H. *frustulósus*, Harv. (*grayish-black Hæmatococcus*); crust widely spreading friable dark-gray, globules roundish hyaline including numerous scattered minute granules.—*Palmella frustulosa, Carm. MSS.*

On irrigated cliffs, perennial, *Capt. Carmichael.*—"It occurs in the form of a greyish-black, fragmentary scurf. On the slightest pressure, it separates into corpuscles of various forms, but mostly sphærical, hyaline under the microscope, surrounded by a membranous envelope including several granules." *Carm. MSS.*

2. H. *sanguíneus*, Ag. (*red Hæmatococcus*); crust spreading soft friable of a brick-red colour, globules polymorphous including 1—3 granules.—*Ag. Ic. Alg. Europ. t.* 24.—*Palmella? sanguinea, Ag. Syst. Alg. p.* 15.—*Palmella? cryptophylla, Carm. MSS. cum icone.*

"On a stalactitic incrustation, lining the vault of a cavern in a quartz rock, Appin," *Capt. Carmichael.*—"This singular production spreads over the dry roof of the cavern to the extent of several yards, in the form of a thick uneven efflorescence, of a brick-red colour externally, but whitish within. It is moist, but not gelatinous, very friable,

and, under the microscope, is found to consist of small pellucid bodies, of various shapes, in each of which are lodged 1—3 minute sphærical granules." *Carm. MSS.*

94. Palmélla. *Lyngb.* Palmella.

A polymorphous gelatinous *frond*, filled with scattered globular or elliptical *granules.*—Name; παλμος, *vibration;*—the fronds (if fronds they can be called) are loosely gelatinous.—In natural affinity, this genus stands exactly intermediate between *Tetraspora* (to which it is allied by *P. terminalis*), and *Noctoc;* thus connecting the great Tribes of *Ulvaceæ* and *Oscillatorieæ*, which, at first sight, appear so little related to each other.

* *Granules elliptical.*

1. P. *protúberans*, Ag. (*soft shapeless Palmella*); thick irregularly lobed very soft green, the granules elliptical.—*Ag. Syst. Alg. p.* 14. *Grev. Crypt. Fl. t.* 243. *f.* 1.—*Ulva protuberans, E. Bot. t.* 2583.

Moist rocks, among mosses.—An inch or two broad, soft and gelatinous.

2. P. *cruénta*, Ag. (*purple Palmella*); "frond crust-like very thin of a dark blood colour." *Grev.*—*Ag. Syst. Alg. p.* 15. *Grev. Crypt. Fl. t.* 205.—*Tremella cruenta, E. Bot. t.* 1800.

On damp walls, chiefly limestone or whitewashed; often in cellars.—It forms extensive patches of a blood-red or purple colour.—"Under the microscope the structure is very obvious; the gelatinous frond swells into globose portions, unequal in size, filled with a multitude of roundish or oval granules." *Grev.*

3. P. *botryoídes*, Lyngb. (*small clustered Palmella*); "minute, fronds densely crowded globose somewhat lobed green suborbicular, granules elliptical." *Grev.*—*Ag. Syst. Alg. p.* 14. *Grev. Crypt. Fl. t.* 243. *f.* 2.—*Byssus botryoides, Huds.*

On heathy places, in moist situations, common.

4. P. *montána*, Ag. (*Mountain Palmella*); between gelatinous and coriaceous much and variously lobed curled dark-purple, granules crowded frequently quaternate. *Hook.*—*Ag. Syst. Alg. p.* 14.—*P. alpicola, Lyngb. Hydroph. Dan. t.* 69.—*Ulva montana, Lightf.*—*E. Bot. t.* 2193. *M'Culloch, West. Isles, v.* 2. *p.* 413. *t.* 30.

On the mountains, Isle of Skye and W. coast of Scotland. Glen Catcol, Arran, *Dr. M'Culloch.* Lying on the ground, but not attached to it, in stony moist places on Goat-fell, Arran, *Hooker.*—According to Lightfoot, this is the "*Mountain Dulse*" of the Scotch, and "the Highlanders wash it, and rub it between their hands in water, so as to make a paste, with which they purge their calves." On the mountains of Arran, this lies unattached among loose wet stones, covering them in a straggling manner to a considerable extent. Each frond is an inch or

an inch and a half in diameter, flattish, somewhat orbicular, between coriaceous and gelatinous, when dry almost horny, of a deep but dull purple colour, much lobed and curled, like some *Gyrophoræ*, filled with crowded clusters of granules, which, if minutely examined, are found to be mostly arranged in fours. *Hook.*

** *Granules globose.*

5. P. *hyalína*, Lyngb. (*green pellucid Palmella*); "frond globose or somewhat elongated pellucid green, the granules globose green." *Grev.—Lyngb. Hydroph. Dan. t.* 69.—*Grev. Crypt. Fl. t.* 247.—*β. muscicola*; (*Carm.*) "frond of no determinate figure, spreading over mosses, of the same pale-green colour as the aquatic variety."—*Carm. MSS.*

In fresh-water streams, &c. Pentland hills, *Dr. Greville*. Appin, in stagnant water, *Capt. Carmichael.*—"The gelatinous mass, scarcely deserving the name of frond, is quite shapeless. Its colour is owing to the granules, which are mostly solitary, but sometimes approximated in pairs or fours." *Carm. MSS.*

6. P. *rupéstris*, Lyngb. (*yellowish Rock Palmella*); frond shapeless rugose yellowish-olive, granules globose associated in fours (sometimes scattered).—*Lyngb. Hydroph. Dan. t.* 69. *Ag. Syst. Alg. p.* 13.

On moist, overhanging cliffs. Appin, *Captain Carmichael.*—"It occurs as a dirty-yellowish gelatinous crust, often hanging down in flakes from the face of the rock. The granules, in my specimens, are mostly solitary, with a dot in the centre; but every thing connected with these imperfect, not to say doubtful, vegetables, is liable to the widest variations." *Carm. MSS.*

7. P. *riviláris*, Carm. (*bright-green River Palmella*); fronds adnate hemisphærical tuberculose often confluent bright-green, granules small globose scattered.

"In a mountain-streamlet, attached to the rocks and stones;" Appin, *Captain Carmichael.*—"*Fronds* one-fourth to half an inch in diameter, hemisphærical, tubercular, firmly adhering, sometimes cohering into a broad crust. *Granules* small, globular, scattered. Colour vivid green. It bears a striking resemblance to *Chætophora tuberculosa*." *Carm. MSS.*

8. P. *lívida*, Carm. (*blackish Palmella*); widely incrusting, fronds polymorphous lobed granulated livid, granules globose small.

"On overhanging cliffs, covering them to an indefinite extent with a dirty black scurf," *Captain Carmichael.*—"*Fronds* of an indeterminate form, lobed and granulated on the surface, of a livid gray colour and filled with exceedingly small granules." *Carm. MSS.*

9. P. *grumósa*, Carm. (*clotted red Palmella*); frond widely expanded clotted brick-red floating, granules globose red, here and there aggregated.

"On a rock at the sea-side, in a small cavity filled with rain-water, at Appin," *Capt. Carmichael.*—"This species forms a clotted gelatinous mass, upwards of a foot in diameter and half an inch thick, of a brick-

red colour, floating in the water. *Granules* mostly in pairs, rather large, globular, with a pellucid limbus." *Carm. MSS.*

10. P. *adnáta*, Lyngb. (*brownish-yellow Palmella*); frond shapeless rugose brownish-yellow, granules globose brown. — *Ag. Syst. Alg. p.* 14. *Lyngb. Hydroph. Dan. t.* 69. — *Tremella adnata, Huds.?*

On alpine rocks.— Admitted into Loudon's Encyclopædia, I presume on the authority of Agardh's doubtful reference to Hudson; but I have seen no specimens.

95. Echinélla. *Ach.* Echinella.

A globose hyaline gelatine, filled with radiating elliptical corpuscules. — Name; *Echinus*, the *Hedgehog* — in allusion to the bristly appearance of its radiating particles. — Minute objects, intermediate between the vegetable and animal kingdoms, to neither of which, exclusively, do they seem to belong.

1. E. *articuláta*, Ag. (*articulated Echinella*); "glaucous, stems jointed undivided spreading every way from a centre and forming a globe." *Sm.* — *Ag. Syst. Alg. p.* 16. — *Conferva echinata, E. Bot. t.* 1378.

In a lake in Anglesea, *Rev. H. Davies.*— "It covers the surface of the water in June and July, and consists of innumerable minute globules, of a glaucous or verdigris-green colour, all nearly of a size." *Sm.*

2. E. *rotáta*, Grev. (*circular Echinella*); "frond plane circular divided by a line passing through the centre, each portion composed of radiating segments cleft nearly to the central line." *Grev. in litt.* — *E. radiosa, Carm. MSS.*

In fresh-water, among *Confervæ* and aquatic mosses, *Capt. Carmichael.* — Minute, scattered, bright transparent green.

3. E. *oblónga*, Grev. (*oblong Echinella*); "frond compressed oblong crenato-pinnatifid and lobed, divided transversely in the middle almost to the centre." *Grev. in litt.*

With the last; *Capt. Carmichael.*— Pale transparent green. "These are animals, instead of plants, if the faculty of locomotion will entitle them to that rank." *Carm. MSS.*

96. Nóstoc. *Vauch.* Nostoc.

A gelatinous or coriaceous, polymorphous *frond;* filled with crisped, moniliform *filaments*, which are finally dissolved into *sporules.* — The meaning of the name is unexplained; it was first used by Paracelsus, and adopted by Vaucher for the present tribe, which before that time was included in *Tremella.* It is closely allied to *Palmella*, from which it differs in the moniliform arrangement of its sporules.

1. *Olive-green, terrestrial.*

1. N. *commúne*, Vauch. (*common Nostoc*); terrestrial, frond

expanded polymorphous plicato-undulate-green.—*Ag. Syst. Alg. p.* 18.—*Tremella Nostoc, E. Bot. t.* 461.

Gravelly soils, rocks, pastures, &c, common.

2. N. *muscórum*, Ag. (*papillose Nostoc*); frond polymorphous mostly orbicular concavo-convex papilloso-tubercular subcoriaceous.—*Ag. Syst. Alg. p.* 19.

On calcareous rocks and the mosses which cover them. Appin, *Capt. Carmichael.*—"*Fronds* gregarious, an inch or more in diameter, of various forms, but inclining more or less to the orbicular, convex above and concave in an equal degree underneath, of a firm dry consistence, and made up of small roundish lobes or papillæ. It bears a strong resemblance to *Collema crispum;* but is much firmer and less gelatinous." *Carm. MSS.*

3. N. *vesicárium*, Dec. (*vesicated Nostoc*); "terrestrial, frond vesicular cartilaginous full of viscid juice."—*Ag. Syst. Alg. p.* 19.

Road-side near Perth, *G. A. W. Arnott, Esq.*—I have seen no specimens of this, which I admit on my friend Mr. Arnott's authority.

4. N. *foliáceum*, Ag. (*foliaceous Nostoc*); cæspitose membranaceous plicato-rugose somewhat erect.—*Ag. Syst. Alg. p.* 19.

On clayey ground, kept constantly damp by the oozing of water. Appin, *Capt. Carmichael.*—"The fronds grow in circular tufts, 5—6 inches in diameter. They are about an inch broad, membranaceous, plaited, curled, wrinkled, of a dirty umber colour." *Carm. MSS.*

5. N. *microscópicum*, Carm. (*minute Nostoc*); fronds densely aggregated very minute polymorphous immersed in a blackish crust.

On exposed calcareous rocks, among mosses. Appin, *Captain Carmichael.* "Wilderness," near Clonmel, *W. H. Harvey.*—"*Fronds* gregarious, from a line to one-twentieth of a line in diameter, and varying in form from globular to linear, of an olive or fulvous colour. In the immature fronds there are no more than 1—2 *filaments.*" *Carm. MSS.*—A curious and very distinct species, almost hyaline under the microscope.

6. N. *humifúsum*, Carm. (*incrusting Nostoc*); fronds very minute subglobose fleshy brownish-green, densely aggregated in a widely spreading stratum.

On rocks exposed to the sea-spray, spreading over the naked earth. Appin, *Captain Carmichael.*—"*Frond* not more than one-fourth of a line in diameter, spreading over the naked soil in a dark-green crust, firm, fleshy and rather opaque." *Carm.*

2. *Olive-green, submersed.*

* *Globose.*

7. N. *prunifórme*, Ag. (*plum-shaped Nostoc*); unattached globose or compressed coriaceo-gelatinous smooth.—*Ag. Syst. Alg. p.* 19. *Lyngb. Hydroph. Dan. t.* 68.

In fresh-water pools, near the sea. Rivulet near Torquay, *Dr. Hooker.* Appin, *Capt. Carmichael.*—"*Fronds* unattached, scattered at random in the clefts of the rocks, globular, smooth, olive-green, diaphanous, from ¼ to 1½ inch in diameter, the larger ones generally compressed, hollow and sometimes ruptured." *Carm. MSS.*

8. N. *sphæ'ricum*, 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.*—"*Fronds* 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. *verrucósum*, 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.—"*Fronds* 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. *cærúleum*, 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. Scythyménia. *Ag.* Scythymenia.

Frond tough, coriaceous, spreading, its surface reticulated with raised, irregularly anastomosing veins; entirely composed of byssoid branched fibres, intermixed with *granules.*—Name; σκυτος, *leather*, and ὑμην, 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 *Nostochineæ.* 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 *Byssoideæ*—perhaps next to *Hygrocrocis.*

1. S. *rupéstris*, 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—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.[1]

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

[1] 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. *lineáta*, 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. Desmídium. *Ag.* Desmidium.

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

1. D. *Swártzii*, 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. *cylíndricum*, 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. Fragilarieæ.

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

100. Fragilária. *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. *pectinális*, 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 pectinalis, 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. *aúrea*, Carm. (*golden Fragilaria*); mucose, filaments very fine gradually attenuated, the joints 2—3 times broader than they are long often punctated 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 olivaceous-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. *diatomoídes*, 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. *striátula*, 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. *confervoídes*, 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. Achnánthes. *Bory.* Achnanthes.

Frond 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. *brévipes*, 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. *lóngipes*, 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. Diátoma. *Ag.* Diatoma.

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

* *Frustula (or joints) rounded.*

1. D. *aurítum*, 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 *Polysiphoniæ* 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. *obliquátum*, 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. *unipunctátum*, 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 *Polysiphoniæ*, *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. *Biddulphiánum*, 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. *striátulum*, 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. *marínum*, 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 teniæformis, 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. *fenestrátum*, 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. *ténue*, Ag. (*slender Diatoma*); filaments of a 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. *elongátum*, 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. *flocculósum*, 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 fasciculate or flabelliform.*[1]

12. D. *crystállinum*, Ag. (*chrystalline 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. *fúlgens*, Grev. (*glittering Diatoma*); frustula truncate golden-yellow arising in a flabelliform manner from a chrystalline 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. *fasciculátum*, 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 chrystalline base.

15. D. *truncátum*, 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. Frustúlia. *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.

[1] As I have adopted Professor Agardh's arrangement of the *Diatomaceæ*, I have retained this little group 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, Lyngb. 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 laminæ.— 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. *cuneáta*, Ag. (*wedge-shaped Styllaria*); frustula with a transverse band of yellow granules, the extremity crenato-dentate. *Ag. Conspect. Crit. Diat. p.* 38. — *Echinella cuneata, Lyngb. Hydroph. Dan. p.* 211. *t.* 70.

Parasitic on the filiform marine *Algæ.* Appin, *Capt. 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; λικμοφορος, *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. *spléndida*, 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. *flabellàta*, 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 μερις, 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 subgeminate, terminating a very slender, simple or branched *filament.* — Name; γομφος, a *wedge*, and νημα, a *thread;* from the shape of the frustules of the filaments.

1. G. *minutíssimum*, 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. — *Exilaria 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. *minútum*, 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 *Confervæ*, &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. *geminátum*, 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. *ampulláceum*, Grev. (*flagon Gomphonema*); densely tufted, stipes elongated dichotomous, frustula in pairs but distinct urn-shaped rounded at the apex. — *Echinella ampullacea, Carm. 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. *paradóxum*, 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; ὁμοιος, *like* or *resembling*, and κλαδος, 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. *frágilis*, 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 μικρος, *small*, and μεγας, *large*; in allusion to the frond resembling some of the larger Algæ, but composed internally of the frustula of the smallest kinds.

1. M. *apiculátum*, 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; σχιζω, to *divide*, and νημα, a *thread*, or *filament*; in allusion to the separation of the frustules.

1. S. *quadripunctátum*, 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*, or *granules*, 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. *helminthósum*, 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. *Dillwýnii*, Ag. (*Dillwyn's Schizonema*); filaments tufted dichotomous capillary acuminated, 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.—*Conferva fœtida, 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 fœtid odour. *Filaments* flaccid, gradually acuminated 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. *spadicéum*, 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. *obtúsum*, 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 myriogranum*.

6. S. *corymbósum*, 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 charactor of monstrosity.

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

On rocks in the sea and on varions 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 olivaceus green colour. I have not seen this plant in a recent state. It is certainly distinct from the following.

8. S. *Grevíllii*, 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 giving 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 *Conferva comoides* of English Botany, which is a plant I cannot understand from the unsatisfactory figure published in that work.

9. S. *Smíthii*, 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 fœtida, 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. *prostrátum*, 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. *hyalína*, 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. *mínor*, 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. *cymbifórmis*, 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. *Frustala* 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. *renifórmis*, 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.

ALPHABETICAL LATIN INDEX

TO

THE GENERIC AND SPECIFIC NAMES AND SYNONYMS

IN THE FIRST HALF OF VOL. II.

PAGE

ACHNANTHES, *Bory*, - 404
brevipes, *Ag.* - - 404
Carmichaelii, *Grev.* - 404
longipes, *Ag.* - - 404
unipunctata, *Grev.* - 409
Agarum esculentum, Bory, 275
ALARIA, *Grev.* - - 275
esculenta, *Grev.* - - 275
ALECTORIA, *Ach.* - - 231
jubata, *Ach.* - - - 231
sarmentosa, *Ach.* - - 231
Amphiconium aureum, Spreng. - - - 384
Linnæi, Spr. - - 385
Amphidium pulvinatum, Sturm, - - - 56
ANDRÆA, *Ehrh.* - - 5
alpina, *Hedw.* - - 5
nivalis, *Hook.* - - 6
petrophila, Ehrh. - 5
Rothii, *Mohr*, - - 5
rupestris, *Hedw.* - - 5
rupestris, Roth, - - 5
ANICTANGIUM, *Hedw.* - 15
cæspititium, Hedw. - 11
ciliatum, *Hedw.* - - 15
ciliatum, γ. Arn. - - 15
compactum, Schwaegr. 73
imberbe, H. & T. - - 15
Lapponicum, Hedw. - 11
striatum, *Wils.* - - 16
trichodes, Schw. - - 25
ANOMODON, *H. & T.* - 76
curtipendulum, *H. & T.* 76
viticulosum, *H. & T.* - 76
ANTHOCEROS, *L.* - - 104
lævis, L. - - - 104
multifidus, Dicks. - 129
punctatus, *L.* - - 104
Antitrichia curtipendula, Brid. - - - 76
ARTHONIA, *Ach.* - - 146
impolita, *Ach.* - - 147
lurida, *Ach.* - - - 147
lyncea, Ach. - - 148
marginata, Duf. - - 151
pruinosa, Ach. - - 147
Swartziana, *Ach.* - - 147
Asperocaulon Arbuscula, Grev. - - - 344
coccineum, Grev. - - 339
ASPEROCOCCUS, *Lamour.* 280
castaneus, *Hook.* - - 281

PAGE

compressus, *Griff.* - 282
echinatus, Grev. - - 281
fistulosus, *Hook.* - - 281
? pusillus, *Carm. MSS.* 281
rugosus, Lamour. - 281
Turneri, *Hook.* - - 281
Auricularia phosphorea, Sow. - - - - 384

BÆOMYCES, *Pers.* - - 141
anomæus, Ach. - - 242
byssoides, Schær. - - 141
cæspititius, Pers. - - 241
microphyllus, Ach. - 241
paschalis, β. Wahl. - 237
placophyllus, *Wahl.* - 141
roseus, *Pers.* - - 141
rubiformis, Ach. - - 197
rufus, *Wahl.* - - 141
BANGIA, *Lyngb.* - - 320
atro-purpurea, Ag. - 320
atro-virens, Lyngb. - 367
calophylla, Carm. - 316
ciliaris, *Carm.* - - 320
fusco-purpurea, *Lyngb.* 320
Johnstoni, Grev. - - 367
Laminariæ, *Lyngb.* - 320
? læte-virens, *Harv.* - 321
lacustris, *Carm.* - - 321
mammillosa, Lyngb. - 367
quadripunctata, Lyngb. 416
Barbula acuminata, Hedw. 49
æstiva, Funck, - - 48
agraria, Hedw. - - 50
apiculata, Hedw. - 48
brevicaulis, Schwaegr. 51
convoluta, Hedw. - - 48
fallax, Hedw. - - 50
gracilis, Schwaegr. - 51
lanceolata, Hedw. - 48
linoides, Brid. - - 51
muralis, Mohr. - - 48
revoluta, Mohr. - - 48
rigida, Hedw. - - 47
ruralis, Hedw. - - 49
stricta, Hedw. - - 48
subulata, Moug. - 49
tortuosa, Schwaegr. - 50
unguiculata, Hedw. - 49
BARTRAMIA, *Hedw.* - 70
arcuata, *Brid.* - - 72
crispa, Brid. - - 71
crispa, Sw. - - - 71

PAGE

fontana, *Sw.* - - 71
fontana, β. Turn. - 71
gracilis, *Floerke*, - - 71
Halleriana, *Hedw.* - 72
ithyphylla, *Brid.* - - 71
marchica, Sw. - - 71
Œderiana, Sw. - - 71
Œderi, Schwaegr. - 71
pomiformis, *Hedw.* - 70
BATRACHOSPERMUM, *Roth*, 391
moniliforme, *Ag.* - - 392
vagum, *Ag.* - - - 392
BELONIA, *Carm.* - - 382
torulosa, *Carm.* - - 383
BERKELEYA, *Grev.* - - 415
gracilis, *Grev.* - - 415
Blasia Hookeri, Corda, - 130
pusilla, L. - - - 130
BONNEMAISONIA, *Ag.* - 299
asparagoides, *Ag.* - 299
BOTRYDIUM, *Wallr.* - 325
argillaceum, Wallr. - 325
granulosum, *Grev.* - 325
BORRERA, *Ach.* - - 226
Atlantica, *Ach.* - - 227
chrysophthalma, *Ach.* - 227
ciliaris, *Ach.* - - 226
flavicans, *Ach.* - - 228
furfuracea, *Ach.* - - 227
leucomela, *Ach.* - - 227
tenella, *Ach.* - - 226
BRYOPSIS, *Lamour.* - 322
Arbuscula, Ag. - - 322
composita, Ag. - - 322
Lyngbyei, Œd. - - 322
hypnoides, *Lamour.* - 322
plumosa, *Ag.* - - 322
BRYUM, *L.* - - - 61
acutum, *Dicks.* - - 28
æstivum, L. - - 11
affine, *Brid.* - - 69
albicans, *Wahl.* - - 63
alpinum, *L.* - - 66
androgynum, *Hedw.* - 61
annotinum, Sm. - - 65
apocarpum, β. L. - 15
argenteum, L. - - 64
argenteum, β. L. - - 62
aureum, Turn. - 64
bicolor, Dicks. - - 65
bimum, Schreb. - - 66
Brownianum, Dicks. - 18
cæspititium, *L.* - - 65

PAGE

calcareum, Dicks. - 27
callistomum, Dicks. - 46
capillare, *L.* - - 65
capillaceum, Dicks. - 34
carneum, *L.* - - 53
Celsii, L. - - - 32
cerviculatum, Dicks. - 42
ciliare, Dicks. - - 22
ciliatum, Dicks. - - 15
compactum, Sm. - - 66
cuneifolium, Dicks. - 50
conoideum, Dicks. - 56
convolutum, Dicks. - 48
crudum, *Huds.* - - 63
cubitale, Dicks. - - 67
curvatum, Dicks. - 27
curvirostrum, Dicks. - 26
cuspidatum, *Schreb.* - 69
cylindricum, Dicks. - 66
delicatulum, Hedw. - 63
demissum, *Hook.* - 67
elongatum, *Dicks.* - 66
ericoides, Dicks. - - 37
extinctorium, L. - - 22
extinctorium, β. L. - 22
fasciculatum, L. - - 27
flavescens, Dicks. - 44
flexifolium, Dicks. - 31
flexuosum, L. - - 42
fontanum, Sm. - - 71
Forsteri, Dicks. - - 11
fragile, Dicks. - - 42
fulvellum, Dicks. - 47
glaucum, L. - - 41
Griffithianum, Dicks. - 10
heterostichum, Dicks. - 42
hornum, Schreb. - - 68
hygrometricum, Sm. - 56
hypnoides, α. L. - - 37
hypnoides, β. L. - - 38
hypnoides, γ. L. - - 37
immersum, Dicks. - 42
inclinans, Dicks. - 43
inclinatum, Dicks. - 32
interruptum, Sm. - 65
julaceum, *Schrad.* - 62
lanceolatum, Dicks. - 24
Lapponicum, Dicks. - 11
laterale, Dicks. - - 72
ligulatum, *Schreb.* - 67
lineare, Dicks. - - 33
linoides, Brid. - - 51
longicollum, Sw. - - 66
longifolium, Dicks. - 43
Ludwigii, *Spreng.* - 63
marginatum, *Dicks.* - 68
minutulum, Dicks. - 24
murale, L. - - - 48
nigricans, Dicks. - 65
nigritum, Dicks. - - 23
nudum, Dicks. - - 23
nutans, *Schreb.* - - 66
ovale, Dicks. - - 31
palustre, *Sw.* - - 61
palustre, Dicks. - - 44
papillosum, Dicks. - 32
parvulum, Dicks. - 32
patens, Dicks. - - 36
paucifolium, Dicks. - 14
pellucidum, Dicks. - 44
piliferum, Dicks. - 41
polyphyllum, Dicks. - 38
pomiforme, L. - - 71
pulchellum, Hedw. - 63
punctatum, *Schreb.* - 68
pulvinatum, L. - - 29
pusillum, Dicks. - - 34
pyriforme, *Sw.* - - 64
pyriforme, L. - - 13
reticulatum, Dicks. - 20
rigidulum, Dicks. - 33

PAGE

rigidum, Huds. - - 48
roseum, *Schreb.* - - 67
rostratum, *Schreb.* - 68
rufescens, Dicks. - 46
rurale, L. - - - 49
scoparium, L. - - 46
serratum, Schrad. - 68
splachnoides, Dicks. - 28
stellare, Sm. - - 65
stellatum, Dicks. - - 50
stelligerum, Dicks. - 11
striatum, β. L. - - 57
striatum, δ. L. - - 60
subulatum, L. - - 49
tetragonum, Dicks. - 21
tortuosum, L. - - 50
Tozeri, *Grev.* - - 69
trichodes, *L.* - - 61
triquetrum, *Turn.* - 62
truncatulum, L. - - 12
turbinatum, *Sw.* - - 65
uncinatum, Dicks. - 42
undulatum, L. - - 52
undulatum, L. - - 52
undulatum, Turn. - 67
vaginale, Dicks. - - 45
ventricosum, *Dicks.* - 66
virens, Dicks. - - 27
verticillatum, L. - - 27
viridulum, Huds. - 27
Wahlenbergii, Funck, 66
Wahlenbergii, Schwaegr. 63
Weissia, Dicks. - - 34
Zierii, *Dicks.* - - 64
BULBOCHÆTE, *Ag.* - - 353
setigera, *Ag.* - - 354
BUXBAUMIA, *L.* - - 72
aphylla, *L.* - - - 72
foliosa, L. - - - 17
indusiata, Brid. - - 72
viridis, Moug. - - 72
BYSSOCLADIUM, *Ag.* - 383
fenestrale, *Ag.* - - 383
Byssus aurea, Sm. - - 384
botryoides, Huds. - 400
candelaris, L. - - 167
incana, L. - - - 185
Jolithus, Ach. - - 168
lactea, L. - - - 167
nigra, Sm. - - - 385
purpurea, Lightf. - 386

CALICIUM, *Ach.* - - 142
æruginosum, *T. & B.* - 145
cantharellum, Sm. - 146
capitellatum, Ach. - 146
chlorellum, *Ach.* - - 144
chrysocephalum, *Ach.* 144
clavellum, *T. & B.* - 143
claviculare, Ach. - 143
curtum, *T. & B.* - - 144
debile, *T. & B.* - - 145
ferrugineum, *T. & B.* - 143
furfuraceum, *Pers.* - 146
hyperellum, *Ach.* - 143
microcephalum, *Sm.* - 142
pallidum, Pers. - - 146
peronellum, *Ach.* - 145
phæocephalum, *T. & B.* 144
salicinum, Pers. - - 145
sessile, *Pers.* - - 142
sphærocephalum, *Ach.* 145
Stigonellum, Ach. - 142
stilbæum, Schær. - - 146
tigillare, *Pers.* - - 143
trachelinum, γ. Ach. - 144
turbinatum, Ach. - 142
tympanellum, *Ach.* - 143
CALITHAMNION, *Lyngb.* - 342
affine, *Harv.* - - 348
Arbuscula, *Lyngb.* - 344

PAGE

Borreri, *Ag.* - - 38
Brodiæi, *Harv.* - - 344
byssoides, *Arn.* - - 346
corymbosum, *Ag.* - 350
cruciatum, *Ag.* - - 341
Daviesii, *Ag.* - - 352
Daviesii, β. Lyngb. - 353
fasciculatum, *Harv.* - 347
floridulum, *Ag.* - - 352
floridulum, Lyngb. - 352
gracillimum, *Ag.* - - 349
granulatum, *Ag.* - - 347
Grevillii, *Harv.* - - 349
Hookeri, *Ag.* - - 345
interruptum, *Ag.* - 351
lanosum, *Harv.* - - 345
lanuginosum, *Lyngb.* - 353
mæsocarpum, *Carm.* - 352
pedicellatum, *Ag.* - 351
Pluma, *Ag.* - - - 344
Plumula, *Lyngb.* - 343
polyspermum, *Ag.* - 346
pubescens, Ag. - - 353
pumilum, *Harv.* - - 343
purpurascens, *Sm.* - 347
purpurascens, Johnst. 349
purpurascens? Brod. - 344
repens, *Lyngb.* - - 352
roseum, *Ag.* - - 345
roseum, Grev. - - 349
Rothii, *Lyngb.* - - 351
secundatum, *Ag.* - - 353
seminudum, *Ag.* - - 348
sparsum, *Harv.* - - 352
spinosum, *Harv.* - - 349
spongiosum, *Harv.* - 350
tetragonum, *Ag.* - - 347
tetricum, *Ag.* - - 346
thuyoides, *Ag.* - - 350
tripinnatum, *Ag.* - 349
Turneri, *Ag.* - - 343
variabile, Ag. - - 343
versicolor, *Ag.* - - 350
virgatulum, *Harv.* - 353
CALOTHRIX, *Ag.* - - 370
Berkeleyana, *Carm.* - 371
cæspitosa, *Harv.* - - 373
confervicola, *Ag.* - 371
distorta, *Ag.* - - 373
fasciculata, *Ag.* - - 372
hydnoides, *Harv.* - 372
interrupta, *Carm.* - 372
lucifuga, Carm. - - 377
luteola, *Grev.* - - 371
mirabilis, *Ag.* - - 373
Mucor, *Ag.* - - - 371
nivea, *Ag.* - - - 371
rufescens, *Carm.* - 372
scopulorum, *Ag.* - - 372
Campylopus flexuosus, Brid. 42
pilifer, Brid. - - 42
saxicola, Brid. - - 29
Carmichaelia attenuata, Grev. - - - 283
CATENELLA, *Grev.* - - 313
Opuntia, *Grev.* - - 313
Catoscopium nigritum, Brid. - - - - 23
Cænomyce alcicornis, Ach. 242
bacillaris, Ach. - - 244
bellidiflora, Ach. - 244
cæspititia, Ach. - - 241
cervicornis, Ach. - 242
coccifera, Ach. - - 244
cornuta, Ach. - - 243
deformis, Ach. - - 244
delicatula, Ach. - - 241
digitata, Ach. - - 244
ecmocyna, a. Ach. - 243
endiviæfolia, Ach. - 242
fimbriata, Ach. - - 243

	PAGE
fimbriata, b. Ach.	243
fimbriata, l. Ach.	243
furcata, Ach.	240
furcata, β. Ach.	240
gonorega, c. Ach.	242
Papillaria, Ehrh.	245
parecha, Ach.	239
pyxidata, Ach.	243
racemosa, Ach.	240
radiata, Ach.	243
rangiferina, Ach.	239
rangiferina, δ. Ach.	239
rubiformis, Ach.	197
Sparassa, Ait.	241
uncialis, Ach.	238
vermicularis, Ach.	238
CERAMIUM, *Adans.*	340
brachygonium, Lyngb.	337
ciliatum, *Ducluz.*	340
diaphanum, *Roth*,	340
Dillwynii, Roth,	340
elongatum, Lyngb.	337
Felixii, Gaillon ?	346
filamentosum, Ag.	341
ocellatum, Gratel.	339
patens, Grev.	339
pennatum. Ed.	328
roseum, Roth,	345
rubrum, *Ag.*	340
secundatum, Lyngb.	340
Turneri, Grev.	343
CETRARIA, Ach.	224
fallax, Ach.	224
glauca, *Ach.*	224
Islandica, *Ach.*	225
juniperina, *Ach.*	224
nivalis, *Ach.*	225
sepincola, *Ach.*	224
CHÆTOPHORA, *Ag.*	393
Berkeleyi, *Grev.*	394
elegans, *Ag.*	393
elegans, Lyngb.	393
endiviæfolia, *Ag.*	393
longæva, *Carm.*	393
marina, Lyngb.	394
multifida, Ag.	389
pellita, *Lyngb.*	394
pisiformis, *Ag.*	393
pisiformis, β. Ag.	393
plana, Ag. ?	398
tuberculosa, *Hook.*	393
CHÆTOSPORA, *Ag.*	310
Wigghii, *Ag.*	310
Chantransia flaviatilis, De Cand.	326
CHARA, *Vaill.*	249
aspera, *Willd.*	250
flexilis, *L.*	249
galioides, De Cand.	250
gracilis, *Sm.*	249
Hedwigii, *Ag.*	250
hispida, *L.*	250
hispida, β. Ag.	251
nidifica, *Ed.*	249
pulchella, Wallr.	250
translucens, *Pers.*	249
vulgaris, *L.*	250
Chlorococcus vulgaris, Grev.	167
murorum, Grev.	167
Chondria arctica, Ag.	302
clavellosa, Ag.	301
dasyphylla, Ag.	300
kaliformis, Ag.	302
obtusa, Ag.	300
Opuntia, Hook.	313
ovalis, Ag.	301
parvula, Ag.	302
pinnatifida, Ag.	300
pusilla, Hook.	309
rhizodes, Ag.	279
tenuissima, Ag.	300
CHONDRUS, *Stach.*	305
Brodiæi, *Grev.*	307
crispus, *Lyngb.*	306
mammillosus, *Grev.*	306
membranifolius, *Grev.*	306
polymorphus, Lamour.	306
rubens, Lyngb.	307
CHORDA, *Stackh.*	280
Filum, *Lamour.*	280
Lomentaria, *Grev.*	280
CHORDARIA, *Ag.*	279
flagelliformis, *Ag.*	279
Opuntia, Spreng.	313
viridis, Ag.	278
CHROOLEPUS, *Ag.*	384
aureus, *Hook.*	384
Arnotti, *Hook.*	385
ebenea, *Ag.*	385
Jolithus, *Ag.*	384
lichenicolus, *Ag.*	385
melænus, *Carm.*	385
mæsomelas, *Carm.*	385
odoratus, *Ag.*	384
CHYLOCLADIA, *Grev.*	301
articulata, *Hook.*	302
clavellosa, *Hook.*	301
kaliformis, *Hook.*	301
ovalis, *Hook.*	301
parvula, *Hook.*	302
CINCLIDOTUS, *Beauv.*	51
fontinaloides, *Beauv.*	51
CLADONIA, *Fée*,	238
bellidiflora, Schær.	244
coccifera, Schær.	244
deformis, Schær.	244
digitata, Schær.	244
filiformis, Schær.	229
filiformis, Schær.	244
fruticosa, γ. Schær.	240
fruticosa, δ. Schær.	240
furcata, *Hoffm.*	240
furcata, *var.* Hoffm.	240
furcata,, β. Schær.	240
gracilis, Hoffm.	243
Papillaria, Hoffm.	245
parasitica, Schær.	241
pungens, *Delise*,	239
pyxidata, Schær.	243
radiata, Hoffm.	243
rangiferina, *Hoffm.*	239
stellata, a. Schær.	239
stellata, δ. Schær.	239
turgida, Hoffm.	239
uncialis, *Hook.*	238
ventricosa, Schær.	241
vermicularis, *De Cand.*	238
verticillata, Schær.	242
CLADOSTEPHUS, *Ag.*	326
Myriophyllum, Ag.	326
spongiosus, *Ag.*	326
verticillatus, *Lyngb.*	326
Climacium dendroides, Mohr.	89
CODIUM, *Stackh.*	321
Bursa, *Ag.*	322
tomentosum, *Stackh.*	322
COLLEMA, *Ach.*	211
Burgessii, *Ach.*	215
ceranoides, *Borr.*	213
cheileum, *Ach.*	212
corniculatum, Hoffm.	214
? corrugatum, *Ach.*	214
cretaceum, *Ach.*	214
crispum, *Borr.*	216
cristatum, *Ach.*	212
dermatinum, *Ach.*	216
fasciculare, *Ach.*	214
flaccidum, *Ach.*	215
fluviatile, *Ach.*	213
fragrans, *Ach.*	212
furvum, Ach.	216
granulatum, *Hook.*	215
lacerum, *Ach.*	217
limosum, *Ach.*	212
marginale, *Hook.*	214
melænum, β. Ach.	214
microphyllum, *Ach.*	211
multipartitum, *Sm.*	214
muscicola, *Ach.*	218
nigrescens, *Ach.*	215
nigrum, *Ach.*	211
palmatum, *Hook.*	214
palmatum, α. Ach.	213
palmatum, β. Ach.	214
plicatile, *Ach.*	213
pulposum, *Ach.*	212
saturninum, *Ach.*	215
Schraderi, *Ach.*	215
Scotinum, β. Ach.	217
sinuatum, *Hook.*	217
spongiosum, *Ach.*	218
tenax, *Ach.*?	213
tenuissimum, *Ach.*	217
tremelloides, *Ach.*	217
tunæforme, *Ach.*	215
turgidum, *Ach.*	213
CONFERVA, *Ag.*	354
Acharii, Dillw.	387
ægagropila, *L.*	360
ærea, *Dillw.*	357
ærea, β. Dillw.	358
æruginosa, *Huds.*	363
albida, *Huds.*	362
alpina, *Bory*,	354
alternata, Dillw.	355
amphibia, Dillw.	332
arachnoidea, Dillw.	383
Arbuscula, Dillw.	339
Arbuscula, R. Br.	344
arcta, *Dillw.*	363
arenosa, *Carm.*	357
aspera, Ag.	360
atra, Dillw.	392
Atramenti, Lyngb.	388
atro-purpurea, Roth,	320
atro-rubescens, Dillw.	335
atro-virens, Dillw.	367
aurea, Dillw.	384
badia, Dillw.	335
barbata, Sm.	342
bicolor, Sm.	365
Biddulphiana, Sm.	409
bipartita ? Sm.	365
bipunctata, Dillw.	365
bipunctata, Sm.	365
bombycina, *Ag.*	354
Borisii, Ag.	355
Borreri, Ag.	348
Borreri, Sm.	348
bracheata,	331
Brodiæi, Dillw.	332
Brownii, *Dillw.*	359
byssoides, Sm.	338
Candollii, Ag.	355
capillaris, *L.*	356
capillaris, Sm.	356
capillaris, Dillw.	356
carnea, *Dillw.*	359
castanea, Dillw.	387
centralis, *Lyngb.*	362
ceramicola, *Lyngb.*	359
coccinea, Dillw.	339
cærulescens, Sm.	364
chalybea, Dillw.	386
ciliata, Dillw.	340
clathrata, Roth,	319
collabens, *Ag.*	358
comoides, Dillw.	413
confervicola, Dillw.	371
corallina, Dillw.	342
corymbifera, Sm.	386

	PAGE
corymbosa, Sm.	350
crassa, *Ag.*	356
crispa, Dillw.	356
crispata, *Roth*,	360
cryptarum, Dill.	387
curta, *Dillw.*	359
Daviesii, *Ag.*	352
Daviesii, Dillw.	352
decorticans, Dillw.	379
decussata, Dillw.	365
denudata, Dillw.	336
diaphana, Dillw.	340
dichotoma, L.	323
diffusa, *Roth*,	362
dissiliens, *Dillw.*	355
distans, Ag.	362
distorta, Dillw.	373
ebenea, Dillw.	385
echinata, Sm.	402
elongata, Dillw.	337
equisetifolia, Dillw.	341
ericetorum, *Roth*,	354
ericetorum, β. Ag.	354
exigua, Dillw.	392
fenestralis, Dillw.	383
ferruginea, Roth,	358
fibrata, Dillw.	333
fistulosa, Roth,	281
flacca, *Dillw.*	358
flaccida, *Dillw.*	358
flavescens, *Roth*,	360
flexuosa, Dillw.	360
floccosa, *Ag.*	355
flocculosa, Dillw.	411
florida, Dillw.	352
fluviatilis, L.	326
fluviatilis, β. Roth,	326
fœniculacea, Huds.	283
fœtida, Dillw.	416
fontinalis, Dillw.	330
fracta, *Ed.*	360
frigida, Dillw.	324
fucicola, *Velley*,	358
fucicola, Ag.	358
fucoides, Dillw.	336
fugacissima, Dillw.	355
fusco-purpurea, Dillw.	320
gelatinosa, Dillw.	392
genuflexa, Dillw.	364
glomerata, *L.*	360
granulosa, Sm.	330
Griffithsiana, Sm.	341
heterochloa, Ag.	362
Hookeri, Dillw.	345
Hutchinsiæ, *Dillw.*	361
ilicicola, Sm.	384
implexa, *Dillw.*	356
interrupta, Sm.	351
intricata, Grev.	356
isogona, Sm.	358
jugalis, Dillw.	366
lactea, Dillw.	389
lætevirens, Dillw.	360
lanosa, *Roth*,	362
lanuginosa, Dillw.	353
lichenicola, Sm.	385
limosa, Dillw.	378
lineata, Dillw.	406
littoralis, Dillw	329
longata, Dillw.	366
Linum, *Roth*,	356
lubrica, Dillw.	355
lubrica, Dillw.	392
lubrica, Sm.	392
majuscula, Dillw.	374
marina, Dillw.	263
melæna, Lyngb.	385
Melagonium, *Web. et Mohr.*	357
Mertensii, Sm.	331
minutissima, Dillw.	389
mirabilis, Dillw.	373
mirabilis, Sm.	362
mucosa, *Mert.*	355
multifida, Sm.	342
muralis, Dillw.	374
muscicola, Sm.	387
muscicola, Web. et Mohr.	387
mutabilis, Dillw.	392
myochrous, Dillw.	369
nana, Dillw.	386
nigra, Dillw.	335
nigrescens, Dillw.	336
nigricans, *Roth*,	359
nitida, Dillw.	366
nivea, Dillw.	371
nummuloides, Dillw.	405
nummuloides, Sm.	406
obliquata, Sm.	409
obtusangula, Lyngb.	363
ocellata, *Dillw.*	368
ochracea, Dillw.	382
odorata, Lyngb.	385
olivacea, Dillw.	329
Orthotrichi, Dillw.	387
pallida, Dillw.	388
paradoxa, Dillw.	319
parasitica, Huds.	334
patens? Dillw.	334
pectinalis, Dillw.	407
pedicellata, Sm.	351
pellucida, *Huds.*	361
pennata, Sm.	328
perreptans, *Carm.*	357
phosphorea, Dillw.	384
pinnata, Dillw.	328
pinnatula, Ed.	360
Pluma, Dillw.	343
Plumula, Dillw.	344
polymorpha, Dillw.	337
princeps, Vauch.	366
protensa, Dillw.	392
purpurascens, *Carm.*	354
purpurea, Dillw.	386
radicans, Dillw,	328
refracta, Ag.	362
repens, Dillw.	352
reticulata, Sm.	363
riparia, *Roth*,	363
rivularis, *L.*	355
rosea, Sm.	345
Rothii, Turt.	351
rubiginosa, Dillw.	384
rubra, Dillw.	340
rupestris, *L.*	361
sanguinea, Dillw.	388
scoparia, Dillw.	327
scopulorum, Dillw.	372
scutulata, *Sm.*	359
setacea, Dillw.	342
setigera, Roth,	353
siliculosa, Dillw.	329
sordida, Dillw.	354
spiralis, Dillw.	366
spongiosa, Dillw.	327
stictica, Sm.	366
stipitata, Sm.	408
striatula, Jurg.	407
striatula, Sm.	409
stricta, Dillw.	333
tenella, Dillw.	352
teniæformis, Sm.	410
tetragona, Dillw.	347
tetrica, Dillw.	347
thyoides, Sm.	350
tomentosa, Dillw.	330
tortuosa, *Dillw.*	356
torulosa, Roth,	326
tumidula, Ag.	355
tumidula, Sm.	355
Turneri, Dillw.	243
Turneri, Sm.	343
typhloderma, Dillw.	388
ulothrix, *Lyngb.*	357
umbrosa, Dillw.	387
urceolata, Lightf.	334
vagabunda, L.	360
vaginata, Sm.	377
Vaucheriæformis, Ag.	363
verrucosa, Sm.	379
verticillata, Dillw.	326
vesicata, *Ag.*	355
vesicata, Dillw.	324
villosa, Huds.	278
vivipara, Dillw.	354
Youngana, *Dillw.*	358
zonata, *Web. et Mohr.*	355
Coniocarpum nigrum, DC.	170
cinnabarinum, DC.	171
CONOSTOMUM, *L.*	21
boreale, *Sw.*	21
Conscinodon nudus, Brid.	23
CORYNEPHORA, *Ag.*	390
marina, *Ag.*	390
CORNICULARIA, *Ach.*	231
aculeata, *Ach.*	232
bicolor, *Ach.*	232
heteromalla, *Hook.*	233
lanata, *Ach.*	233
ochroleuca, *Ach.*	232
pubescens, Ach.	367
spadicea, Ach.	232
tristis, *Ach.*	232
Cryphæa heteromalla, Brid.	77
CUTLERIA, *Grev.*	285
multifida, *Ag.*	285
CYMBELLA, *Ag.*	418
cymbiformis, *Ag.*	418
hyalina, *Ag.*	418
minor, *Ag.*	418
reniformis, *Ag.*	418
Cynontodium capillare, Hedw.	35
inclinatum, Hedw.	32
longirostre, Schwaegr.	35
trifarium, Hedw.	34
Cyphellium leucocephalum, Ach.	156
CYRTODON, *Br.*	21
splachnoides, *Br.*	21
CYSTOSEIRA, *Ag.*	269
abrotanifolia, Ag.	270
barbata, *Ag.*	269
ericoides, *Ag.*	269
fibrosa, *Ag.*	270
fæniculacea, *Ag.*	269
granulata, *Ag.*	269
siliquosa, Ag.	270
DALTONIA, *H. & T.*	77
heteromalia, *H. & T.*	77
pennata, Arn.	75
splachnoides, H. & T.	77
DASYA, *Ag.*	338
Arbuscula, Ag.	344
coccinea, *Ag.*	339
Hutchinsiæ, *Hook.*	339
ocellata, *Hook.*	339
simpliciuscula, Ag.	339
spongiosa, Ag.	344
DELESSERIA, *Lamour.*	289
alata, *Lamour.*	289
bifida, Lamour.	293
Bonnemaisonii, Ag.	291
Brodiæii, Lamour.	307
ciliata, Lamour.	295
dentata, Lamour.	297
edulis, Lamour.	312
filicina, Lamour.	310
glandulosa, Ag.	297

PAGE

Gmelini, Lamour. - 292
Hilliæ, Grev. - - 291
Hypoglossum, *Ag.* - 290
lacerata, Ag. - - 292
laciniata, Grev. - - 293
Palmetta, Lamour. - 294
palmata, Lamour. - 295
Plocamium, Ag. - - 297
Plocamium, Ag. - - 297
rubens, Lamour. - - 307
ruscifolia, *Lamour.* - 292
sanguinea, *Lamour.* - 289
sinuosa, *Lamour.* - 289
ulvoides, Hook. - - 291
DESMARESTIA, *Lamour.* - 277
aculeata, *Lamour.* - 277
ligulata, *Lamour.* - 277
viridis, Lamour. - - 278
Desmatodon latifolium, Brid. - - - 41
Desmia aculeata, Lyngb. 277
Hornemanni, Lyngb. - 308
ligulata, Lyngb. - - 277
DESMIDIUM, *Ag.* - - 406
cylindricum, *Grev.* - 406
Swartzii, *Ag.* - - 406
DIATOMA, *Ag.* - - 408
arcuatum, Lyngb. - 409
auritum, *Lyngb.* - - 408
Biddulphianum, *Ag.* - 409
brachygonum, *Carm.* - 410
crystallinum, *Ag.* - 411
elongatum, *Ag.* - - 411
fasciculatum, *Ag.* - - 411
fenestratum, *Lyngb.* - 410
flocculosum, *Ag.* - - 410
fulgens, *Grev.* - - 411
marinum, *Lyngb.* - 409
obliquatum, *Lyngb.* - 409
striatulum, *Ag.* - - 409
Swartzii, Ag. - - 409
tenue, *Ag.* - - - 410
tenue, γ. Lyngb. - - 410
truncatum, *Grev.* - 411
unipunctatum, *Ag.* - 409
DICHLORIA, *Grev.* - - 278
viridis, *Grev.* - - 278
DICRANUM, *Hedw.* - - 59
aciculare, Hedw. - - 38
adiantoides, *Sw.* - - 40
Bruntoni, Sm. - - 33
bryoides, *Sw.* - - 39
callistomum, Sm. - - 46
Celsii, Hedw. - - 32
cerviculatum, *Hedw.* - 41
congestum, Schwaegr. - 46
crispum, *Hedw.* - - 45
cylindricum, Web. - 36
cylindricum, Sm. - - 14
ciliptcum, Turn. - - 38
falcatum, *Hedw.* - - 33
flagellare, *Hedw.* - - 45
flavescens, *Sm.* - - 44
flavidum, Schwaegr. - 32
flexuosum, *Hedw.* - 42
fulvellum, *Sm.* - - 47
fuscescens, Turn. - 46
glaucum, *Hedw.* - - 41
gracilescens, Web. - 44
heteromallum, *Hedw.* - 46
intermedium, Hedw. - 32
latifolium, *Hedw.* - 41
longifolium, *Hedw.* - 41
longirostre, Schwaegr. - 46
majus, Turn. - - 46
montanum, Hedw. - 45
osmundioides, Turn. - 39
ovale, Hedw. - - 30
ovatum, Hedw. - - 30
papillosum, Brid. - - 32
patens, Sm. - - - 36

PAGE

pellucidum, *Sw.* - - 50
polycarpon, *Ehrh.* - 43
polyphyllum, Sm. - - 38
polysetum, Sw. - - 45
pulvinatum, Sw. - - 29
pulvinatum, β. Sw. - 29
purpurascens, Hedw. - 32
purpureum, Hedw. - 32
pusillum, Hedw. - - 41
rigidulum, Sw. - - 46
rufescens, Turn. - - 46
saxicola, Mohr. - - 29
Schreberianum, *Hedw.* 42
sciuroides, Sw. - - 74
scoparium, *Hedw.* - 45
Scottianum, Turn. - 45
spurium, *Hedw.* - - 44
Starkii, *Web.* - - 43
strictum, Schwaegr. - 45
strictum, Sm. - - 32
strumiferum, *Ehrh.* - 43
subulatum, *Hedw.* - 47
tamarindifolium, Turn. 40
taxifolium, Sw. - - 40
uncinatum, Sm. - - 42
undulatum, *Ehrh.* - 45
varium, *Hedw.* - - 46
virens, *Hedw.* - - 42
viridissimum, Sm. - 11
viridulum, Sw. - - 39
DICTYOSIPHON, *Grev.* - 283
fæniculaceus, *Grev.* - 283
DICTYOTA, *Lamour* 284
atomaria, *Grev.* - - 284
ciliata, Lamour. - - 284
dichotoma, *Lamour* - 284
penicillata, Lamour. - 285
zonata, *Lamour* - - 284
DIDYMODON, *Hedw.* - 32
brachydontius, *Wils.* - 34
Bruntoni, *Arn.* - - 33
capillaceus, *Schrad.* - 34
crispulus, *Wils.* - - 34
cylindricus, *Hook.* - 36
flexifolius, *H. & T.* - 32
glaucescens, *Web.* - 33
heteromallus, *H. & T.* - 35
homomallus, Hedw. - 35
inclinatus, *Sw.* - - 32
longirostris ? *Web.* - 35
nervosus, *H. & T.* - 32
obscurus, Kaulf. - - 33
purpureus, *H. & T.* - 32
pusillus, *Hedw.* - - 35
reconditus, Wils. - - 34
rigidulus, *Hedw.* - - 33
trifarius, *Sw.* - - 34
Diplomitrion Lyellii, Corda, - - - 32
Diplocomium longisetum, Web. - - - 62
DIPHYSCIUM, *Mohr*, - 17
foliosum, *Mohr*, - - 17
Dissodon Frælichianum, Grev. - - - 20
splachnoides, Grev. - 21
DRAPARNALDIA, *Bory*, - 392
glomerata, *Ag.* - - 392
plumosa, *Ag.* - - 392
tenuis, *Ag.* - - - 392
DUMONTIA, *Lamour.* - 312
filiformis, *Grev.* - - 312
incrassata, Lamour. - 312
triquetra, Lamour. - 312

ECHINELLA, Ach. - - 402
ampullacea, Carm. - 414
articulata, *Ag.* - - 502
circularis, Grev. - - 413
cuneata, Lyngb. - - 412
cuneata, Jurg. - - 412

PAGE

fasciculata, Grev. - 411
fasciculata, Lyngb. - 411
oblonga, *Grev.* - - 402
obtusa, Lyngb. - - 412
paradoxa, Grev. - - 414
radiosa, Carm. - - 402
rotata, *Grev.* - - 402
stipitata, Lyngb. - - 408
ECTOCARPUS, *Lyngb.* - 329
aureus, Lyngb. - - 384
brachiatus, *Sm.* - - 331
brachiatus, Ag. - - 330
crinitus, *Carm.* - - 330
cruciatus, Ag. - - 331
distortus, *Carm.* - - 330
granulosus, *Ag.* - - 330
littoralis, *Lyngb.* - - 329
Mertensii, *Ag.* - - 331
siliculosus, *Lyngb.* - 329
sphærophorus, *Carm.* - 330
tomentosus, *Lyngb.* - 330
Ectosperma cæspitosa, Vauch. - - - 325
geminata, Vauch. - 324
terrestris, Vauch. - 334
Encælium bullosum, Ag. 281
echinatum, Ag. - - 281
Lyngbyanum, Grev. - 281
ENCALYPTA, *Hedw.* - - 21
affinis. Hedw. - - 22
ciliata, *Hedw.* - - 22
ciliata, γ. Sm. - - 23
Daviesii, Sm. - - 39
lanceolata, Turn. - - 24
pilifera, Funck, - - 22
rhaptocarpa, *Schw.* - 22
streptocarpa, *Hedw.* - 22
vulgaris, *Hedw.* - - 22
ENDOCARPON, *Hedw* - 159
complicatum, Ach. - 160
euplocum *Ach.* - - 161
fuscellum, *Hook.* - - 163
Hedwigii, *Ach.* - - 160
lachneum, Ach. - - 160
læte-virens, *Turn.* - 162
leptophyllum, *Ach.* - 161
miniatum, *Ach.* - - 160
miniatum, β. Wahl. - 161
pallidum, *Ach.* - - 161
psoromoides, *Hook.* - 161
pulchellum, *Borr.* - 162
sinopicum, *Ach.* - - 163
sorediatum, *Hook.* - 162
smaragdulum, *Ach.* - 162
tephroides, *Ach.* - - 162
tephroides, β. Ach. - 163
viride, Ach. - - 162
viridulum, Schrad. - 157
Weberi, Ach. - - 160
ENTEROMORPHA, *Link*, - 317
clathrata, *Grev.* - - 319
clathrata, β. Grev. - 318
clathrata, γ. Grev. - 319
compressa, *Grev.* - - 318
Cornucopiæ, *Carm.* - 317
erecta, *Carm.* - - 313
intestinalis, *Link*, - 317
Linckiana, *Grev.* - - 318
? percussa, *Carm.* - 319
ramulosa, *Hook.* - - 319
Enterographa crassa, Fée, 165
ENTOSTHODON, *Schwaegr.* 55
Templetoni, *Schw.* - - 55
Eremodon splachnoides, Brid. - - - - 21
EVERNIA, *Ach.* - - 228
prunastri, *Ach.* - - 228
Exilaria circularis, Grev. 413
flabellata, Grev. - - 413
fasciculata, - - - 411
fulgens, Grev. - - 411

	PAGE
minutissima, Berk.	414
truncata, Grev.	411
Fegatella officinalis, Raddi,	107
Fissidens adiantoides, Hedw.	40
asplenioides, Schwaegr.	39
bryoides, Hedw.	39
dubius, Beauv.	40
exilis, Hedw.	39
grandiflorus, Schwaegr.	40
incurvus, Schwaegr.	40
osmundioides, Hedw.	39
palmatus, Hedw.	40
polycarpus, Hedw.	43
pulvinatus, Hedw.	29
strumifer, Hedw.	43
tamarindifolius, Brid.	40
taxifolius, Hedw.	40
FONTINALIS, *L.*	77
alpina, Dicks.	51
antipyretica, *L.*	77
capillacea, *Dicks.*	78
minor, L.	51
pennata, L.	75
secunda, Dicks.	77
squamosa, *L.*	78
FRAGILARIA, *Lyngb.*	406
aurea, *Carm.*	407
confervoides, *Grev.*	407
diatomoides, *Grev.*	407
lineata, Lyngb.	406
nummuloides, Lyngb.	405
pectinalis, *Lyngb.*	407
striatula, *Ag.*	407
unipunctata, Lyngb.	409
FRUSTULIA, *Ag.*	411
lanceolata, Berk.	418
minor, Ag.	418
? obtusa, *Ag.*	411
FUCUS, *Ag.*	270
abrotanifolius, L.	270
acicularis, Wulf.	304
aculeatus, L.	277
alatus, Huds.	290
albidus, Huds.	303
amphibius, Huds.	299
asparagoides, Woodw.	299
articulatus, Lightf.	302
bacciferus, Turn.	268
Balticus, Ag.	271
barbatus, Good.	269
bifidus, Huds.	294
bifidus, Good.	293
bifurcatus, W.	273
Brodiæi, Turn.	307
bulbosus, Huds.	275
Bursa, Turn.	322
cæspitosus, Stackh.	309
cæspitosus, Stackh.	313
canaliculatus, *L.*	272
capillaris, Turn.	390
cartilagineus, Turn.	308
ceranoides, *L.*	271
ceranoides, Gmel.	306
ceranoides, *vars.* Lightf.	306
ciliatus, Huds.	295
ciliatus, *vars.* Turn.	295
clavellosus, Turn.	301
coccineus, Huds.	297
confervoides, L.	303
corneus, Huds.	309
coronopifolius, Good.	308
crinalis, Turn.	309
crispatus, Huds.	292
crispus, Huds.	307
crispus, L.	306
cristatus, L.	294
dasyphyllus, Woodw.	300
dentatus, L.	297
deustus, Œd.	285
digitatus, L.	275
discors, L.	270
distichus, Lightf.	271
echinatus, Stackh.	306
edulis, Stackh.	312
endivifolius, Lightf.	292
ericoides, L.	269
esculentus, Lightf.	275
fastigiatus, L.	288
fastigiatus, Huds.	287
fibrosus, Huds.	270
filamentosus, Wulf.	341
filicinus, Huds.	309
filicinus, Wulf.	310
filiformis, Huds.	306
Filum, L.	280
fimbriatus, Huds.	307
flagelliformis, Œd.	279
fæniculaceus, Woodr.	269
fæniculaceus, L.	270
fruticulosus, Wulf.	331
Gigartinus, L.	304
glandulosus, Banks,	297
granateus, Lamour.	291
granulatus, Good.	269
granulatus, L.	269
Griffithsiæ, Turn.	305
Hypoglossum, Good.	290
jubatus, Good.	295
kaliformis, Good.	302
kaliformis, γ. Turn.	302
laceratus, Gmel.	292
laceratus, γ. Turn.	292
lacerus, Stackh.	306
laciniatus, Huds.	293
lichenoides, Good.	274
ligulatus, Lightf.	277
longissimus, Stackh.	303
loreus, L.	273
lumbricalis, Gmel.	287
lumbricalis, Lamour.	287
Lycopodioides, L.	298
Mackaii, *Turn.*	272
mammillosus, Good.	306
membranaceus, Stackh.	286
membranifolius, Good.	307
membranifolius, *var.* Turn.	307
mucronatus, Turn.	269
natans, Turn.	268
nereideus, Lightf.	309
nodosus, *L.*	272
nodosus, γ. Ag.	272
obtusus, Huds.	300
obtusus, Huds.	300
ocellatus, Lamour.	291
Opuntia, Good.	373
Osmunda, Gmel.	300
ovalis, Huds.	301
palmatus, L.	295
Palmetta, Esp.	294
patens, Good.	306
pedunculatus, Huds.	278
Phyllitis, Stackh.	276
pinastroides, Gmel.	298
pinnatifidus, Huds.	300
pinnatus, Huds.	309
pistillatus, Gmel.	304
plicatus, Huds.	305
Plocamium, Gmel.	297
plumosus, L.	311
polymorphus, *var.* Lamour.	306
polypodioides, Lamour.	286
polyschides, Lightf.	276
prolifer, Lightf.	307
punctatus, With.	291
purpurascens, Huds.	303
pusillus, Stackh.	309
pusillus, Huds.	274
pygmæus, Lightf.	274
pygmæus, β. Turn.	274
radiatus, Good.	288
reniformis, Grev.	296
repens, Lightf.	313
rhizodes, Turn.	279
rotundus, Gmel.	288
rubens, Huds.	289
rubens, L.	307
ruscifolius, Turn.	290
saccharinus, Sm.	276
saccharinus, L.	276
saccharinus, *var.* Turn.	276
sanguineus, L.	289
Sarniensis, Mert.	295
scorpioides, Huds.	298
sedoides, Good.	301
selaginoides, L.	269
serratus, *L.*	271
siliquosus, Stackh.	270
sinuosus, Good.	289
soboliferus, Œd.	296
spiralis, Lightf.	271
stellatus, Stackh.	306
subfuscus, Wood.	298
subtilis, Turn.	283
tamariscifolius, Huds.	269
Teedii, Roth,	305
tenuissimus, Good.	300
Thrix, Stackh.	280
tomentosus, Huds.	322
tuberculatus, *Huds.*	273
tuberculatus, Lightf.	301
ulvoides, Turn.	291
verrucosus, Huds.	303
vesiculosus, *L.*	271
viridis, Œd.	378
Wigghii, Turn.	390
FUNARIA, *Schreb.*	55
Hibernica, *Hook.*	56
hygrometrica, *Hedw.*	56
Muhlenbergii, *Turn.*	56
Muhlenbergii, Mohr.	56
Templetoni, Sm.	55
FURCELLARIA, *Lamour.*	287
fastigiata, *Lamour.*	287
rotunda, Lyngb.	288
Gagea compacta, Raddi,	56
Gastridium articulatum, Grev.	302
clavellosum, Lyngb.	301
filiforme, Lyngb.	313
kaliforme, Lyngb.	302
lubricum, Lyngb.	317
Opuntia, Lyngb.	281
parvulum, Grev.	302
ovale, Grev.	301
purpurascens, Lyngb.	301
GELIDIUM, *Lamour.*	308
cartilagineum, *Grev.*	308
clavatum, Lamour.	309
concatenatum, Lamour.	308
corneum, *Lamour.*	309
coronopifolium, Lamour.	308
intricatum, Lamour.	309
pinnatifidum, Lyngb.	300
versicolor, Lamour.	308
GIGARTINA, *Lamour.*	302
acicularis, *Lamour.*	304
articulata, Lamour.	302
clavellosa, Lamour.	301
compressa, *Hook.*	303
confervoides, *Lamour.*	303
dasyphylla, Lamour.	303
erecta, *Hook.*	304
flagellaris, Lamour.	279
Griffithsiæ, *Grev.*	305
kaliformis, Lamour.	302
Lycopodium, Lyngb.	298
Opuntia, Lamour.	313
ovata, Lamour	301

	PAGE
pedunculata, Lamour.	278
pilosa, Lamour.	313
Pinaster, Lyngb.	298
pistillata, *Lamour.*	304
plicata, *Lamour.*	305
purpurascens, *Lamour.*	303
sulfusca, Lamour.	298
Teedii, *Lamour.*	305
tenuissima, Lamour.	300
vermicularis, Lamour.	301
viridis, Lyngb.	278
Gloionema apiculatum, Grev.	415
spadiceum, Carm.	416
Gloiosiphonia capillaris, Carm.	390
GLYPHOMITRION, *Brid.*	39
Daviesii, *Brid.*	39
GOMPHONEMA, *Ag.*	413
ampullaceum, *Grev.*	414
Berkeleyi, *Grev.*	413
geminatum, *Ag.*	414
minutum, *Ag.*	414
minutissimum, *Grev.*	413
parasiticum, *Ag.*	414
Gracilaria compressa, Grev.	303
confervoidea, Grev.	303
erecta, Grev.	304
purpurascens, Grev.	303
Graphis betuligna, Ach.	149
dendritica, Ach.	151
elegans, Ach.	150
Lyellii, Ach.	151
microscopica, Ehrh.	148
scripta, Ach.	151
serpentina, Ach.	151
GRATELOUPIA, *Ag.*	310
filicina, *Ag.*	310
Griffithia Daviesii, Br.	39
GRIFFITHSIA, *Ag.*	341
barbata, *Ag.*	342
corallina, *Ag.*	342
equisetifolia, *Ag.*	341
multifida, *Ag.*	342
setacea, *Ag.*	342
GRIMMIA, *Ehrh.*	28
acuta, Turn.	28
alpicola, Swartz,	28
apocarpa, *Hedw.*	28
apocaula, Hoffm.	28
atrata, *Miel.*	31
atrata, Hook.	31
atrovirens, Sm.	32
Browniana, Sm.	18
calcarea, Sm.	27
catenulata, Mohr,	84
cernua, Brid.	30
cirrata, Sm.	25
conostoma, Sm.	21
controversa, Sm.	26
crispula, Turn.	26
Daviesii, Turn.	41
Dicksoni, Sm.	25
Doniana, *Sm.*	31
elliptica, Arn.	36
gracilis, Schwaegr.	28
heteromalla, Sm.	35
homomalla, Sm.	35
inclinata, Sm.	32
lanceolata, Sm.	32
leucophæa, *Grev.*	30
maritima, *Turn.*	28
nuda, Sm.	23
nigrita, Sm.	23
ornithopodioides, Mohr,	74
ovata, *Web.*	30
pulvinata, *Sm.*	29
pusilla, Sm.	27
recurvata, Hedw.	27
recurvirostra, Sm.	27
rivularis, Br.	28
saxicola, *Schwaegr.*	29
Schisti, Sm.	25
spiralis, *H. & T.*	30
splachnoides, Sm.	19
splachnoides, Sm.	21
Starkeana, Sm.	24
striata, Schrad.	25
stricta, Turn.	29
Studetica? Schw.	31
torta, *Horns.*	30
torquata, Hook.	30
trichophylla, *Grev.*	29
unicolor, *Hook.*	31
verticillata, Turn.	27
Gyalecta bryophila, Ach.	176
cupularis, Schær.	188
Gymnocephalus androgynus, Schwaegr.	61
conoides, Schwaegr.	56
Gymnomitrion concinnum, Corda,	114
Hookeri, Corda,	111
GYMNOSTOMUM, *Hedw.*	10
æruginosum, Sm.	12
æstivum, Hedw.	73
affine, Bryol.	13
affine, Wils.	12
articulatum, Brid.	12
cæspititium, *Web.*	10
ciliatum, Sw.	15
conicum, *Schwaegr.*	13
curvirostrum, *Hedw.*	11
curvirostrum, Hobs.	12
Donianum, *Sm.*	14
fasciculare, *Hedw.*	13
Forsteri, Sm.	11
Griffithianum, *Sm.*	10
Heimii, *Hedw.*	13
imberbe, Sm.	16
intermedium, Turn.	12
intermedium, Schw.	13
Lapponicum, *Hedw.*	11
luteolum, Sm.	11
luteolum, Sm.	73
microstomum, *Hedw.*	14
minutulum, Schwaegr.	13
obtusum, Hedw.	13
osmundaceum, Sm.	16
ovatum, *Hedw.*	12
paucifolium, Sm.	14
pennatum, Hedw.	16
pomiforme, Brid.	11
pyriforme, *Hedw.*	13
rufescens, Brid.	12
rupestre, *Schwaegr.*	12
rutilans, Hedw.	14
stelligerum, Brid.	12
stelligerum? Schrad.	11
tenue, *Hedw.*	14
trichodes, Mohr,	25
truncatulum, *Hoffm.*	12
truncatum, Hedw.	12
verticillatum, Turn.	27
viridissimum, *Sm.*	11
Wilsoni, *Hook.*	12
GYROPHORA, *Ach.*	221
arctica, Ach.	222
cylindrica, *Ach.*	222
deusta, *Ach.*	222
erosa, *Ach.*	222
glabra, Ach.	221
murina, *Ach.*	222
pellita, *Ach.*	223
polyphylla, *Hook.*	221
proboscidea, *Ach.*	221
pustulata, Ach.	223
HÆMATOCOCCUS, *Ag.*	399
frustulosus, *Harv.*	399
Grevillii, Ag.	399
sanguineus, *Ag.*	399
HALIDRYS, *Lyngb.*	270
nodosa, Lyngb.	272
siliquosa, *Lyngb.*	270
HALISERIS, *Tozzetti*,	286
polypodioides, *Ag.*	286
HALYMENIA, *Ag.*	312
bifida, Gmel.	293
edulis, Ag.	312
elongata, Grev.	312
filiformis, Ag.	313
furcellata, *Ag.*	312
ligulata, *Ag.*	312
Opuntia, Ag.	313
palmata, Ag.	295
purpurascens, var. Grev.	313
reniformis, Ag.	296
? sobolifera, Ag.	296
HEDWIGIA, *Hook.*	73
æstiva, *Hook.*	73
ciliata, Hedw.	15
HIMANTHALIA, *Lyngb.*	273
lorea, *Lyngb.*	273
HOMŒOCLADIA, *Ag.*	405
Anglica, *Ag.*	415
HOOKERIA, *Sm.*	78
læte-virens, *H. & T.*	78
lucens, *Sm.*	78
splachnoides, *Hook.*	77
Hutchinsia atro-rubescens, Ag.	335
badia, Hook.	335
byssoides, Ag.	338
Brodiæi, Ag.	332
Brodiæi, Lyngb.	332
coccinea, Ag.	339
denudata, Ag.	336
elongata, Ag.	337
fastigiata, Ag.	337
fibrillosa, Ag.	338
furcellata, Ag.	336
Lyngbyæi, Ag.	332
Mœstingii, Lyngb.	335
nigrescens, Ag.	336
ocellata, Ag.	339
parasitica, Ag.	335
patens, Ag.	334
penicillata, Ag.	332
roseola, Ag.	333
spinulosa, Ag.	334
stricta, Ag.	333
strictoides, Lyngb.	332
urceolata, Lyngb.	334
violacea, Ag.	336
Wulfenii, Ag.	331
HYDRODICTYON, *Roth*,	363
pentagonum, Vauch.	363
utriculatum, *Roth*,	363
Hymenostomum microstomum, Br.	14
HYGROCROCIS, *Ag.*	387
Atramenti, *Ag.*	388
barytica, *Ag.*	388
pallida, *Ag.*	388
Rosæ, *Ag.*	388
sanguinea, Ag.	388
typhloderma, *Ag.*	388
Vini, *Ag.*	388
HYPNUM, *L.*	79
abietinum, *L.*	91
abbreviatum, Hedw.	84
adiantoides, L.	40
adnatum, Turn.	97
aduncum, *L.*	98
albicans, *Neck.*	88
Algerianum, Brid.	81
alopecurum, *L.*	88
alpestre, *Swartz.*	83
alpinum, Turn.	86
asplenioides, Dicks.	40
Atlanticum, Desf.	93

	PAGE
atro-virens, *Dicks.*	97
atro-virens, Sw.	87
attenuatum, Dicks.	97
Blandovii, *Web.*	92
blandum, *Hook.*	92
brevirostre, *Ehrh.*	96
brevirostre, Sm.	93
bryoides, L.	39
catenulatum, *Schwaegr.*	85
chrysocomum, Dicks.	72
chrysophyllum, Brid.	94
commutatum, *Hedw.*	99
complanatum, *L.*	80
compressum, L.	100
confertum, *Dicks.*	94
confertum, Sm.	84
Conferva, Schwaegr.	85
contextum, Hedw.	82
cordifolium, *Hedw.*	94
crassinervium, *Wils.*	92
crenulatum, Sm.	93
crispum, L.	76
crista-castrensis, *L.*	100
crista-castrensis, Dicks.	100
cupressiforme, *L.*	99
curtipendulum, L.	76
curvatum, *Sw.*	89
cuspidatum, *L.*	94
cuspidatum, β. Turn.	94
cylindricum, Dicks.	74
delicatulum, Hedw.	90
dendroides, *L.*	89
denticulatum, *L.*	80
denticulatum, β. Turn.	81
dimorphum, *Brid.*	95
Donianum, Sm.	81
dubium, Sw.	97
fallax, Brid.	97
filamentosum, Dicks.	97
filicinum, *L.*	96
filicinum, Schwaegr.	99
flagellare, *Dicks.*	91
flagellare, Hedw.	86
flavescens, *Wils.*	84
fluitans, *L.*	98
fluviatile, Funck,	82
fluviatile, Sw. ?	97
fluviatile, Turn.	97
gracile, L.	74
Halleri, *L.*	95
Halleri, *var.* Schwaegr.	95
illecebrum, Sm.	84
implexum, Sw.	82
intricatum, Funck,	93
inundatum, Dicks.	81
julaceum, Schwaegr.	85
laricium,	91
longirostrum, Ehrh.	93
loreum, *L.*	95
lucens, L.	78
luridum, Hedw.	97
lutescens, *Huds.*	87
lycopodioides, Schwaegr.	98
medium, *Dicks.*	81
micans, *Wils.*	91
molle, *Dicks.*	92
molluscum, *Hedw.*	100
moniliforme, *Wahl.*	85
murale, *Hedw.*	84
muticum, Sw.	85
myosuroides, *Hedw.*	89
myosuroides, Hedw.	89
nigro-viride, Dicks.	100
nitens, *Schreb.*	88
nitidulum, Wahl.	86
obtusatum, Wahl.	81
palustre, *L.*	97
parietinum, Sw.	90
pennatum, Dicks.	75
piliferum, *Schreb.*	84
plumosum, *L.*	85
plumosum, Hedw.	87
polyanthos, *Hook.*	87
polyanthos, Sm.	100
polymorphum, *Hedw.*	94
polymorphum, Funck,	95
populeum, *Hedw.*	82
prælongum, *L.*	90
proliferum, *L.*	90
prolixum, Dicks.	93
pulchellum, *Dicks.*	86
purum, *L.*	84
recognitum, Hedw.	90
reflexum, *Web.*	82
revolvens, Sm.	98
riparium, *L.*	80
ripariοides, Hedw.	93
rufescens, *Dicks.*	86
rugosum, Hedw.	98
rugulosum, *Web.*	98
ruscifolium, *Neck.*	93
rutabulum, *L.*	92
salebrosum, *Hoffm.*	87
Schreberi, *Willd.*	85
sciuroides, L.	75
scorpioides. *L.*	99
sericeum, *L.*	87
serpens, *L.*	81
serrulatum, Hedw.	94
Silesianum, *Beauv.*	99
Smithii, Dicks.	74
spinulosum, Hedw.	82
splendens, *Hedw.*	90
squarrosum, *L.*	96
squarrulosum, Sm.	95
stellatum, *Schreb.*	96
Stokesii, Turn.	90
stramineum, *Dicks.*	83
stramineum, β. Schwaeg.	83
striatum. *Schreb.*	93
subtile, Dicks.	82
Swartzii, Turn.	90
sylvaticum, Schwaegr.	81
tamariscinum, Hedw.	90
taxifolium, L.	40
Teesdalii, Dicks. ?	98
tenellum, *Dicks.*	81
tenue, Schrad.	82
trichomanoides, *L.*	79
trifarium, *Web.*	83
triquetrum, *L.*	96
triquetrum, β. H. & T.	96
umbratum, Sm.	91
uncinatum, *Hedw.*	98
undulatum, *L.*	80
velutinum, *L.*	93
viticulosum, L.	76
Wahlenbergii, Web.	63
Hyssopus Salomonis, Hasselq.	13
IRIDÆA, *Bory*,	311
edulis, *Bory*,	312
reniformis, Bory,	296
ISIDIUM, *Ach.*	234
coccodes, *Ach.*	234
corallinum, *Ach.*	235
corallinum, Ach.	235
lævigatum, Ach.	235
lutescens, *T. & B.*	234
microstictieum, *T. & B.*	235
oculatum, *Ach.*	236
paradoxum, *Ach.*	235
phymatodes, Ach.	234
phymatodes, β. Ach.	234
Westringii, *Ach.*	235
JUNGERMANNIA, *L.*	110
adunca, Dicks.	124
affinis, *Wils.** (see note at p. 132.)	115
albescens, *Hook.*	123
albicans, *L.*	118
angulosa, Dicks.	117
anomala, *Hook.*	120
asplenioides, *L.*	111
barbata, *Schreb.*	123
bicrenata, Schmid.	114
bicuspidata, *L.*	115
bicuspidata, Sm.	122
bidentata, *L.*	122
Blasia, *Hook.*	130
byssacea, *Roth*,	116
calyptrifolia, *Hook.*	128
capitata, *Hook.*	116
ciliaris, *L.*	126
cochleariformis, *Weis*,	119
cochleariformis, With.	117
compressa, *Hook.*	113
concatenata, L.	125
concinnata, *Lightf.*	114
connivens, *Dicks.*	116
cordifolia, *Hook.*	112
crenulata, *Sm.*	113
cuneifolia, *Hook.*	121
curvifolia, *Dicks.*	116
decipiens, *Hook.*	112
Dicksoni, *Hook.*	119
dilatata, *L.*	129
divaricata, Sm.	116
Doniana, *Hook.*	112
emarginata, *Ehrh.*	114
endiviæfolia, Dicks.	131
epiphylla, *L.*	130
excisa, *Dicks.*	115
exsecta, *Schmid.*	119
fissa, Scop.	121
Francisci, *Hook.*	122
fruticulosa, Sm.	131
furcata, *L.*	131
furcata, Hedw.	130
furcata, β. Web.	131
hamatifolia, *Hook.*	127
heterophylla, *Schrad.*	122
Hibernica, *Hook.*	132
Hookeri, *Sm.*	111
Hutchinsiæ, *Hook.*	128
hyalina, *Lyell*,	113
incisa, *Schrad.*	117
inflata, *Huds.*	114
inflata, Hobs.	115
julacea, *L.*	124
juniperina, *Sw.*	124
lævigata, *Schrad.*	126
lanceolata, *L.*	112
lanceolata, Sm.	121
laxifolia, *Hook.*	124
Lyellii, *Hook.*	131
Mackaii, *Hook.*	127
macrorhiza, Dicks.	114
minuta, *Crantz*,	119
minutissima, *Sm.*	128
multifida, *L.*	129
nemorosa, *L.*	117
obtusifolia, *Hook.*	119
Orcadensis, *Hook.*	114
pauciflora, Dicks.	125
pinguis, *L.*	129
planifolia, *Hook.*	117
platyphylla, *L.*	125
polyanthos, *L.*	131
pubescens, *Schrank*,	131
pumila, *With.*	112
pulcherrima, Web.	126
purpurea, Sm.	118
purpurea, Scop.	120
pusilla, *L.*	117
quinquedentata, Huds.	123
reptans, *L.*	123
resupinata, *L.*	118
resupinata, Sm.	117
scalaris, *Schrad.*	120
scalaris, Schmid.	121

	PAGE
scutata, *Web.*	122
serpyllifolia, *Dicks.*	127
sertularoides, L.	125
setacea, *Web.*	125
setiformis, *Ehrh.*	125
sinuata, Dicks.	130
sphærocarpa, *Hook.*	113
sphærocephala, With.	121
Sphagni, *Dicks*,	113
spinulosa, *Dicks.*	111
stipulacea, Hook.	122
Tamarisci, *L.*	129
tamariscifolia. Schreb.	129
Taylori, *Hook.*	120
Thuya, Dicks.	126
tomentella, *Ehrh.*	129
tomentosa, Hoffm.	131
Trichomanis, *Dicks.*	121
trichophylla, *L.*	125
tridenticulata, Mich.	112
trilobata. *L.*	123
turbinata (under the name of *J. affinis*), see note, p. 128.	115
Turneri, *Hook.*	115
umbrosa, *Schrad.*	118
undulata, *L.*	118
varia, L.	118
ventricosa, *Dicks.*	115
viticulosa, *L.*	121
Wondraczelci, Corda,	117
Woodsii, *Hook.*	126
LAMINARIA, *Lamour.*	275
bulbosa, *Lamour.*	275
debilis, *Ag.*	276
digitata, *Lamour.*	275
esculenta, Lyngb.	275
latifolia, Ag.	276
papyrina, *Bory.*	276
Phyllitis, *Lamour.*	276
saccharina, *Lamour.*	276
saccharina. var. Grev.	276
LAURENTIA, *Lamour.*	299
cæspitosa, Lamour.	300
cyanosperma, Lamour.	300
dasyphylla, *Grev.*	300
gelatinosa, Lamour.	300
intricata, Lamour.	300
lutea, Lamour.	300
obtusa, *Lamour.*	300
pinnatifida, *Lamour.*	299
tenuissima, *Grev.*	300
LECANORA, *Ach.*	190
aipospila, *Ach.*	191
albella, *Ach.*	191
apochræa, Ach.	172
argopholis, *Ach.*	190
aspersa, *Borr.*	192
atra, *Ach.*	190
badia, Ach.	191
brunnea, β. Ach.	186
byssina, *Hook.*	194
cæsio-rufa, *Hook.*	193
cæsio-rufa, Ach.	188
candelaria, Ach.	198
carneo-lutea, *Ach.*	195
cerina, *Ach.*	194
cervina, Ach.	191
chloroleuca, *Ach.*	194
cinereo-fusca, Ach.	188
circinnata, Ach.	200
citrina, *Ach.*	196
coarctata, *Ach.*	191
crassa, Ach.	197
crassa, Ach.	198
crenulata, *Hook.*	194
cyrtaspis, Ach.	177
effusa, Ach.	187
elæina, Ach.	201
elegans, Ach.	199
epigæa, Ach.	199
erythrella, Ach.	190
exigua, *Hook.*	191
expallens, Ach.	185
frustulosa, *Ach.*	193
fulgens, Ach.	199
galactina, β. Ach.	194
gelida, Ach.	200
glaucoma, *Ach.*	193
Hæmatomma, *Ach.*	194
hypnorum, Ach.	198
hypnorum, Ach.	198
lentigera, Ach.	199
leucolepis, Ach.	198
milvina, *Ach.*	191
milvina, β. Ach.	188
miniata, Ach.	199
murorum, Ach.	199
oculata, Ach.	236
Parella, *Ach.*	195
periclæa, *Ach.*	191
periclæa, β. Ach.	191
rubra, *Ach.*	194
rubricosa, Ach.	193
salicina, Ach,	190
saxicola, Ach.	201
sophodes, *Ach.*	192
spodophæa, *Ach.*	192
squamulosa, *Hook.*	191
Stonei, Ach.	194
subfusca, *Ach.*	193
tartarea, *Ach.*	195
tartarea, γ. Ach.	195
thelostoma, *Hook.*	193
tribacia, Ach.	198
tuberculosa, *Ach.*	192
Turneri, Ach.	195
varia, *Ach.*	194
ventosa, *Ach.*	193
verrucosa, Ach.	175
verrucosa, β. Ach.	175
virella, Ach.	206
vitellina, *Ach.*	196
LECIDEA, *Ach.*	177
æruginosa, *Borr.*	185
abietina, *Ach.*	183
alabastrina, *Ach.*	188
alba, Ach	167
albo-atra, *Borr.*	184
albo cærulescens, Ach.	183
anomala, *Ach.*	186
aromatica, *Turn.*	183
artyta, Ach.	186
atrata, *Wahl.*?	178
atro-alba, *Ach*,	178
atro-cinerea, *Hook.*	178
atro-flava, *Turn.*	189
atro-rufa, Ach.	196
atro-virens. b. Ach.	182
aurantiaca, *Ach.*	190
cachumena, *Ach.*	179
canescens, *Ach.*	201
carneola, Ach.	187
chalybea, *Borr.*	180
citrinella, Ach.	182
citrinella, β. Ach.	182
confluens, *Ach.*	179
? *conspurcata*, Ach.	172
coracina, Ach.	178
cornea, *Ach.*	187
coronata, *Borr.*	186
corticola, Ach.	184
decipiens, Ach.	197
decolorans, Flörke,	186
desertorum, Ach.	186
dubia, *T. & B.*	180
Ehrhartiana, *Ach.*	189
Ehrhartiana, β. Ach.	192
elæochroma, Ach.	180
enteroleuca, Ach.	181
epipolia, Ach.	184
erythrella, *Borr.*	190
echaroides, Ach.	186
expallens, *Borr.*	185
ferruginea, *Hook.*	188
flavo-virescens, *Borr.*	182
fumosa, *Ach.*	179
fusco-atra, *Ach.*	178
fusco-lutea, *Ach.*	187
Gagei, *Hook.*	181
geographica, *Hook.*	182
Griffithsii, *Hook.*	181
icmadophila, *Ach.*	188
immersa, *Ach.*	183
incana, *Hook.*	185
incompta, *Borr.*	184
intricata, *Borr.*	189
intricata, Ach.	189
irrubata, *Ach.* ?	187
lapicida, *Ach.*	179
Lightfootii, *Ach.*	184
lucida, *Ach.*	189
lutea, *Borr.*	189
luteo-alba, Ach.	190
luteola, Ach.	187
lyncea, Ach.	148
margaritacea, β. Ach.	172
marmorea, *Ach.*	188
melizea, Ach.	189
microphylla, *var.* Ach.	102
muscorum, *Hook.*	181
Œderi, *Ach.*	182
papillosa, Ach.	235
parasema, *Ach.*	180
parasema, b. *Ach.*	180
petræa. *Ach.*	179
pholidiota, Ach.	197
pinicola, *Borr.*	180
Pineti, *Ach.*	187
plocina, Ach.	150
polytropa, *Ach*,	189
premnea, *Ach.*	180
privigna, *Ach.*	188
prominula, *Borr.*	179
pruinosa, *Ach.*	183
pulverea, *Borr.*	185
pustulata, Ach.	223
quadricolor, *Borr.*	186
quernea, *Ach.*	184
rivulosa, *Ach.*	183
rubiformis, Ach.	197
rufescens, Borr.	177
rupestris, *Ach.*	187
sabuletorum, Flörke,	181
sanguinaria, *Ach.*	181
scabrosa, *Ach.*	182
scalaris, *Ach.*	196
silacea, *Ach*	182
simplex, *Borr.*	183
speirea, *Ach.*	184
subcarnea, *Ach.*	188
sulphurea, *Ach.*	185
synothea, *Ach.*	183
Turneriana, Ach.	189
uliginosa, *Ach.*	183
ulmicola, *Borr.*	189
vernalis, *Borr.*	187
verruculosa, *Borr.*	178
vesicularis, Ach.	196
viridescens, *Ach.*	184
viridi-atra, *Ach.*	181
Leersia ciliata, Hedw.	22
extinctoria, Hedw.	22
lanceolata, Hedw.	24
Lejeunia dilatata, Libert.	129
LEMANIA, *Bory*,	325
fluviatilis, *Ag.*	326
torulosa, *Ag.*	326
LEPRARIA, *Ach.*	166
alba, *Ach.*	167
botryoides, Ach.	167
cinereo-sulphurea, *Ach.*	168
flava, *Ach.*	167

	PAGE
incana, Ach.	184
Jolithus, *Ach.?*	168
lutescens, Ach.	234
murorum, *Grev.*	167
nigra, *T. & B.*	168
ochracea, *T. & B.*	167
rubens, Ach.	168
virescens, *Sm.*	168
viridis, *T. & B.*	167
LEPTOMITUS, *Ag.*	389
clavatus, *Ag.*	389
lacteus, *Ag.*	389
minutissimus, *Ag.*	389
Leskea complanata, Hedw.	79
dendroides, Hedw.	88
incurvata, Hedw.	97
julacea, Mohr,	85
lucens, DC.	78
polyantha, Hedw.	86
polycarpa, Ehrh.	81
pulchella, Hedw.	86
rufescens, Schwaegr.	86
sericea, Hedw.	87
trichamonoides, Hedw.	79
LEUCODON, *Schwaegr.*	74
Morensis, Schwaegr.	75
sciuroides, *Schwaegr.*	74
Lichen abietinus, Ach.	184
Acharii, Wahl.	176
acicularis, Sm.	144
acrotellus, Ach.	159
aculeatus, β. Lightf.	232
affinis, Dicks.	200
agæleus, Ach.	175
aipospilus, Wahl.	192
albellus, Pers.	195
alcicornis, Lightf.	242
aleurites, Ach.	207
analeptus, Sm.	153
anomæus, Sm.	242
apththosus, L.	219
aquaticus, Weis	160
aquilus, Ach.	207
argænus, Ach.	175
aromaticus, Sm.	181
articulatus, L.	231
articulatus, β. Sm.	231
Atlanticus, Sm.	227
ater, Sm.	190
atratus, Sm.	178
atro-albus, L.	178
atro-cinereus, Dicks.	178
atro-flavus, Sm.	189
atro-rufus, Dicks.	196
aurantiacus, Lightf.	190
auratus, Sm.	209
Bæomyces, L.	141
barbatus, L.	231
bellidiflorus, Ach.	245
bicolor, Ehrh.	232
brunneus, Sm.	186
Burgessii, Lightf.	215
byssinus, Dicks.	194
byssoides, L.	141
cærulo-nigricans, Lightf.	196
cærulescens, Dicks.	201
cæsio-rufus, Schrad.	195
cæsius, Ach.	200
cæsius, Dicks.	182
cæspititius, Sm.	241
calicaris, L.	229
calicaris, Huds.	229
calvus, Dicks.	187
candelarius, L.	198
candicans, Dicks.	199
canescens, Dicks.	201
candidus, Sm.	184
caninus, L.	219
caninus, β. Huds.	220
caninus, γ, Lightf.	220
cantharellus, Sch.	146
capitatus, Schreb.	146
carneo-luteus, Sw.	195
carnosus, Dicks.	198
cartilagineus, Lightf.	197
cechumenus, Sm.	199
ceuthocarpus, Sm.	164
Cereolus, Ach.	237
cerinus, Dicks.	194
cervicornis, Ach.	242
chalibeiformis, L.	231
chloroleucus, Sm.	194
crysocephalus, Turn.	144
crysopthalmus, L.	227
ciliaris, L.	226
ciliaris, β. Huds.	227
cinereus, Sm.	176
cinereus, Sm.	176
circinnatus, Ach.	200
citrinus, Ach.	196
citrinus, Sm.	182
citrinus, Hedw.	202
clavellus, Sm.	143
clausus, Hoffm.	166
Clementi, Sm.	200
coarctatus, Sm.	191
cochleatus. Dicks.	217
cocciferus, L.	244
coccineus, Dicks.	194
coccodes, Ach.	234
compositus, Ach.	193
concentricus, DC.	179
confinis, Ach.	274
confluens, Sm.	179
conspersus, Ach.	203
conspurcatus, Sm.	172
contiguus, Sm.	179
corallinus, L.	236
corneus, With.	181
corneus, With.	187
corniculatus, Light.	232
cornucopioides, Lightf.	244
cornutus, L.	243
corrugatus, Dicks.	214
corrugatus, Sm.	205
corticola, Sm.	184
crassus, Huds.	197
crenulatus, Dicks.	194
cretaceus, Sm.	214
crinitus, Lightf.	222
crispus, Sm.	212
crispus, L.	214
cristatus, Huds.	212
crocatus, L.	209
croceus, L.	218
cupularis, Hedw.	188
cycloselis, Ach.	206
cylindricus, L.	222
cyrtellus, Sm.	186
dædaleus, Sm.	202
dealbatus, Ach.	235
debilis, Sm.	145
decipiens, Hedw.	197
deformis, L.	244
delicatus, Ehrh.	241
dendriticus, Dicks,	178
deustus, L.	221
deustus, Lightf.	222
diacapsis, Sm.	179
diatrypus, Ach,	208
Dicksoni, With.	182
diffusus, Dicks.	207
digitatus, L.	244
discoideus, Ach.	173
dispersus, Ach.	194
dolosus, Sm.	181
dubius, Sm.	181
effusus, Sm.	186
effusus, Sm.	187
Ehrhartianus, Sm.	189
elegans, Sm.	199
elæinus, Wahl,	202
encaustus, Sm.	207
endiviæfolius.	242
epipolius, Sm.	184
ericetorum, Ehrh.	188
erosus, Ach.	222
erythrellus, Sm.	190
escharoides, Sm.	186
exanthematicus, Sm.	166
exiguus, Ach,	191
fagineus, L.	473
Fahlunensis, L.	206
fallax, Web.	224
farinaceus, L.	229
farinosus, Hoffm.	175
fascicularis, L.	214
fastigiatus, Ach.	229
ferrugineus, Hoffm.	234
ferrugineus, Huds.	188
fibrosus, Sm.	176
filiformis, Huds.	244
fimbriatus, L.	243
flaccidus, Ach.	215
flavicans, Sw.	228
flavo-virescens, Dicks.	182
flavus, Schreb.	167
flocculosus, Westr.	222
floridus, L.	230
floridus, β. Huds.	230
fluviatilis, Huds.	214
foliaceus, Huds.	242
fragilis, Huds.	236
fragilis, L.	236
fragrans, Sm.	212
fraxineus, L.	229
frigidus, Sw.	195
frustulosus, Dicks.	193
fuciformis, L.	226
fulgens, Ach.	199
fuliginosus, Dicks.	210
furcatus, Huds.	240
furfuraceus, L.	227
furvus, Ach.	216
fuscellus, Turn.	163
fusco-luteus, Dicks.	187
fuscus, Huds.	207
Gagei, Sm.	157
gelasinatum, With.	142
gelidus, L.	200
geographicus,	182
glaber, Ach.	221
glaucoma, Sm.	193
glaucus. L.	224
glebulosus,	197
globiferus, L.	236
globuliferus, Sm.	173
glomuliferus, Lightf.	202
gracilis, L.	243
graniformis, Sm.	189
granulatus, Huds.	215
granulosus, Dicks.	186
Griffithii, Sm.	181
griscus, Ach.	223
Hæmatomma, Ehrh.	194
Harrimanni, Sm.	157
hirtus, L.	230
heteromallus, Sm.	233
hispidus, Hoffm.	227
hispidus, Lightf.	232
Hoffmanni, Sm.	176
horizontalis, L.	219
hyperellus, Ach.	144
hymenius, Ach.	164
hypnophila, Turn.	185
hypnorum, Œd.	198
Hookeri, Sm.	198
icmadophila, L.	188
immersus, With.	183
impolitus, Ehrh.	147
impolitus, Sm.	171
incanus, Sm.	185

	PAGE
inclusus, Sm.	165
incurvus, Pers.	206
inquinans, Sm.	143
intricatus, Desf.	227
intricatus, Schrad.	189
Islandicus, L.	225
jubatus, L.	231
jubatus, β. Sm.	231
juniperinus, L.	224
juniperinus, Lightf.	224
lacer, Sm.	217
lacerus, Ach.	217
lachneus, Ach.	160
lachneus, Ach.	163
lacteus, L.	174
læte-virens, Lightf.	204
lævigatus, Sm.	204
lanatus, L.	233
lanuginosus, Hoffm.	205
lentigerus, Web.	199
leptophyllus, Sm.	161
leptophyllus, Sm.	160
leptophyllos, Sm.	161
leucolepis, Wahl.	198
leucomelos, L.	227
leucophæus, Dicks.	196
Lightfootii, Sm.	184
limbatus, Sm.	210
limosus, Ach.	212
lucidus, Ach.	189
luteo-albus, Turn.	190
lutescens, Hoffm.	234
luteus, Dicks.	189
lynceus, Sm.	148
macilentus, Ehrh.	244
marginatus, Huds.	214
marginatus, Bernh.	212
marmoreus, Dicks.	188
maurus, Sm.	158
membranaceus, Dicks.	200
microphyllus, Sm.	241
microphyllus, Schrad.	199
microsticticus, Sm.	234
miniatus, L.	160
miniatus, β. With.	160
miscellus, Sm	181
multifidus, Dicks.	206
muralis, Dicks.	201
multiflorus, Huds.	125
multipunctatus, Sm.	174
multipunctatus, Sm.	176
murinus, Ach.	223
murorum, Ach.	197
muscicola, Ach.	218
muscorum, L.	181
nanus, Ach.	237
niger, Huds.	221
nigrescens, Ehrh.	215
nigrescens, Huds.	215
nivalis, L.	225
obscurus, With.	207
obscurus, Sm.	165
ochroleucus, Ehrh.	233
oculatus, Dicks.	236
Œderi, Sm.	182
olivaceus, L.	205
omphalodes, L.	203
orostheus, Sm.	185
quadricolor, Dicks.	186
querneus, Dicks.	184
pallidus, Sm.	161
palmatus, Huds.	214
Papillaria, Ehrh.	245
parasemus, Sm.	180
parasiticus, Hoffm.	241
Parellus, L.	195
parietinus, L.	208
parilis, Ach.	221
paschalis, L.	237
pellitus, Ach.	223
perforatus, Ach.	204
pericleus, Sm.	191
perlatus, L.	204
peronellus, Ach.	146
pertusus, L.	164
petræus, Jacq.	179
pezizoides, Dicks.	186
phæocephalus, Turn.	144
physodes, L.	208
piceus, Dicks.	191
Pinastri, Scop.	224
pinicola, Ach.	180
pityreus, Ach.	205
plicatilis, Ach.	213
pliçatus, L.	230
plumbeus, Lightf.	201
plumbosus, Sm.	157
pollinarius, Ach.	230
polycarpus, Ehrh.	198
polydactylus, Jacq.	220
polymorphus, Ach.	229
polyphyllus, L.	221
polyrhizus, Lightf.	223
polytropus, Sm.	189
polytropus, Ehrh.	189
porriginosus, Turn.	187
proboscideus, Ach.	221
proboscideus, L.	222
pruinosus, Dicks.	183
Prunastri, L.	228
pseudo-coralloides, Westr.	235
pubescens, Sm.	367
pullus, Lightf.	207
pulmonarius, L.	210
pulposus, Bernh.	212
pulverulentus, Ehrh.	205
pulverulentus, Schreb.	205
punctiformis, Sm.	154
punctatus, Dicks.	177
pungens, Ach.	139
pustulatus, L.	223
pyxidatus, L.	243
pyxidatus, β. Huds.	243
pyxidatus, ι. Huds.	244
pyxidatus, ξ. Huds.	244
pyxidatus, λ. Huds.	243
pyxidatus, μ. Huds.	244
pyxidatus, ς. Huds.	243
radiatus, Huds.	232
radiatus, Schreb.	243
rangiferinus, L.	239
resupinatus, L.	220
rimosus, Sm.	184
rivulosus, Sm.	183
Roccella, L.	226
rosellus, Sm.	188
rubellus, Ach.	148
rubiformis, Wahl.	197
rubiginosus, Ach.	200
rufescens, Neck.	220
rufus, Huds.	141
rupestris, L.	215
rupestris, Scop.	187
rupestris, Sm.	187
rupicola, Dicks.	193
saccatus, L.	218
salicinus, Schrad.	190
sanguinarius, Sm.	181
sarmentosus, Ach.	231
saturninus, Sm.	215
saxatilis, L.	203
saxicola, Ach.	201
scabrosus, Sm.	182
scalaris, Ach.	196
Schraderi, Bernh.	215
Schraderi, Sm.	156
scopulorum, Retz.	229
scorteus, Ach.	203
scrobiculatus, Scop.	210
scruposus, Dicks.	176
scutatus, Dicks.	219
sepincola, Ehrh.	224
silaceus, Sm.	182
siliquosus, Huds.	229
simplex, Dav.	183
simplex, Sm.	188
sinopicus, Sm.	163
sinuatus, Huds.	217
sinuosus, Sm.	207
smaragdulus, Sm.	163
sophodes, Ach.	192
spadiceus, Roth.	232
sparassus, Sm.	241
speciosus, Wulf.	206
speireus, Sm.	184
sphærocephalus, Web.	145
sphæroides, Dicks.	187
spinosus, Huds.	240
spodophæus, Wahl.	192
spongiosus, Sm.	218
spurius, Ach.	220
squamulosus, Sm.	191
stellaris, L.	205
stictoceros, Sm.	228
stigmatellus, Sm.	153
stygius, L.	206
subfuscus, L.	193
subulatus, L.	240
sulphureus, Sm.	185
sylvaticus, Huds.	211
tartareus, L.	195
tenax, Sm.	213
tenellus, Web.	227
tennissimus, Dicks.	215
terrestris, Sm.	159
tessellatus, Sm.	157
testaceus, Winch,	197
tephroides, Sm.	163
thelostomus, Sm.	193
tigillaris, Ach.	143
tiliaceus, Hoffm.	204
torrefactus, Lightf.	222
trapeziformis, Dicks.	160
trabinellus, Sm.	144
tremelloides, Huds.	217
tremelloides, L.	217
tricolor, With.	188
tristis, Web.	232
tuberculosus, Sm.	192
tubiformis, Lightf.	244
tunæformis, Ach.	215
turgidus, Sm.	239
Turneri, Sm.	196
Ulmi, Sw.	194
uliginosus, Schrad.	185
Upsaliensis, L.	195
umbrinus, Ach.	159
uncialis, L.	238
uncialis, β. Lightf.	239
varians, Dav.	193
varius, Ach.	194
velatus, Sm.	174
ventosus, Sm.	193
venosus, L.	219
ventricosus, Lightf.	242
vermicularis, Swartz.	238
vernalis, L.	187
verrucosus, Huds.	210
verruculosus, Sm.	178
Vespertilio, Lightf.	215
vulpinus, Huds.	228
virellus, Ach.	206
virens, L.	182
viridus, Schreb.	167
viridescens, Schrad.	185
viridulus, Sm.	156
vitellinus, Ehrh.	196
volvatus, Vill.	166
Westringii, Ach.	235
LICHINA, *Ag.*	274
confinis, *Ag.*	274
pygmæa, *Ag.*	274

PAGE

pygmæa, β. Hook - 274
LICMOPHORA, *Ag.* - 412
flabellata, *Ag.* - - 492
Jurgensii, *Ag.* - - 412
splendida, *Grev.* - - 412
Linkia clavata, Carm. - 395
dura, Lyngb. - - 396
dura, γ. Lyngb. - 397
natans, Lyngb. - - 398
punctiformis, Lyngb. - 395
velutina, Carm. - - 329
Lobaria aculeata, Hoffm. 232
miniata, Hoffm. - - 199
Lomentaria articulata, *Opuntia*, Gaill. - - 313
LYNGBYA, *Ag.* - - 375
Carmichaelii, *Harv.* - 375
crispa, Carm. - - 375
ferruginea, *Ag.* - - 374
ferruginea, β. *Ag.* - 374
littoralis, Gaill. - - 329
majuscula, *Harv.* - 374
muralis, *Ag.* - - 374
prolifica, *Grev.* - - 374
speciosa, *Carm.* - - 375
subsalsa, Carm. - - 374

MARCHANTIA, *Mich.* - 105
androgyna, H. & T. - 108
androgyna, L.? - 108
conica, *L.* - - - 107
hemisphærica, *L.* - 108
irrigua, *Wils.* - - 110
? lævis, *Wils.* - - 107
polymorpha, *L.* - - 106
quadrata, Scop. - 108
Meesia demissa, Hoppe, 67
dealbata, Sw. - - 62
longiseta, Hedw. - 62
uliginosa, Hedw. - 62
MELOSEIRA, *Ag.* - - 405
Borreri, *Grev.* - - 405
discigera, Ag. - - 405
lineata, *Ag.* - - 406
nummuloides, *Grev.* - 405
nummuloides, Ag. - 406
MERIDION, *Ag.* - - 413
circulare, *Ag.* - - 413
radians, Ag. - - 413
MESOGLOIA, *Ag.* - - 389
capillaris, *Ag.* - - 390
coccinea, *Ag.* - - 390
Griffithsiana, *Grev.* - 391
Hudsoni, *Ag.* - - 389
multifida, *Ag.* - - 389
purpurea, *Harv.* - 390
vermicularis, *Ag.* - 391
virescens, *Carm.* - 391
Metzgeria pinguis, Corda, - - - 129
MICROCLADIA, *Grev.* - 297
glandulosa, *Grev.* - 297
MICROMEGA, *Ag.* - - 415
apiculatum, - - 415
Mnium affine, Bland. - 69
albicans, Wahl. - 63
androgynum, L. - 61
arcuatum, Dicks. - 72
cirratum, L. - - 25
conoides, Sm. - - 56
crudum, L. - - - 63
cuspidatum, Hedw. - 69
cuspidatum, Hedw. - 69
fissum, L. - - - 121
fontanum, L. - - 71
hornum, L. - - 69
hygrometricum, L. - 120
Jungermannia, L. - 120
marchicum, Hedw. - 71
minor, Brid. - - 62
osmundaceum, Dicks. - 12

PAGE

palustre, L. - - 61
polytrichoides, β. L. - 54
pseudo-triquetrum, Hedw. - - - 67
punctatum, Hedw. - 68
purpureum, L. - - 32
pyriforme, L. - - 64
roseum, Hedw. - - 67
rostratum, Schwaegr. - 68
serpyllifolium, α. L. - 68
serpyllifolium, β. L. - 69
serpyllifolium, δ. L. - 67
serratum, Schwaegr. - 68
Trichomanis, L. - 121
triquetrum, L. - - 62
turbinatum, Hedw. - 65
undulatum, Hedw. - 67
Monema apiculatum, Grev. - - - 415
comoides, Grev. - 417
Dillwynii, Grev. - 416
obtusum, Grev. - - 417
prostratum, Berk. - 418
quadripunctatum, Grev. 416
MOUGEOTIA, *Ag.* - - 363
cærulescens, *Ag.* - 364
compressa, *Ag.* - - 364
genuflexa, *Ag.* - - 364
Mucor furfuraceus, L. - 146
MYCINEMA, *Ag.* - - 383
arachnoideum, *Ag.* - 385
fulvum, *Ag.* - - 385
phosphoreum, *Ag.* - 384
rubiginosum, *Ag.* - 383
MYRIONEMA, *Grev.* - 394
clavatum, *Harv.* - 395
punctiforme, *Harv.* - 395
strangulans, *Grev.* - 395

NECKERA, *Hedw.* - - 75
crispa, *Hedw.* - - 76
curtipendula, Hedw. - 76
dendroides, Sw. - - 89
heteromalla, Hedw. - 77
pennata, *Hedw.* - 75
pumila, *Hedw.* - - 75
viticulosa, Hedw. - 76
NEPHROMA, *Ach.* - - 220
parilis, *Ach.* - - 220
resupinata, *Ach.* - 220
Nitella gracilis, Ag. - 250
flexilis, Ag. - - 249
nidifica, Ag. - - 249
opaca, Ag. - - 249
translucens, Ag. - 249
NITOPHYLLUM, *Grev.* - 290
Bonnemaisonii, *Grev.* - 291
Gmellini, *Grev.* - - 292
Hilliæ, Grev. - - 291
laceratum. *Grev.* - 292
ocellatum, *Grev.* - 290
punctatum, *Grev.* - 291
ulvoideum, *Hook.* - 291
Nodularia fluviatilis, Lyngb. - - - 326
NOSTOC, *Vauch.* - - 402
cærulem, *Lyngb.* - 404
commune, *Vauch.* - 402
foliaceum, *Ag.* - - 403
foliaceum, Carm. - 403
humifusum, *Carm.* - 403
microscopicum, *Carm.* 403
muscorum, *Ag.* - - 403
pruniforme, *Ag.* - 403
sphæricum, *Vauch.* - 404
verrucosum, *Vauch.* - 404
vesicarium, *DC.* - 403

ODONTHALIA, *Lyngb.* - 297
dentata, *Hook.* - - 297
ŒDIPODIUM, *Schwaegr.* - 10

PAGE

Griffithianum, *Schwaegr.* 10
Oncophorus cerviculatus, Brid. - - - 42
falcatus, Brid. - - 43
polycarpus, Brid. - 43
Starkii, Brid. - - 44
strumifer, Brid. - 43
virens, Brid. - - 42
OPEGRAPHA, *Ach.* - - 147
astroidea? Ach. - 149
atra, *Pers.* - - - 149
betulina, *Pers?* - - 149
calcarea, *Ach.* - - 150
calcarea, Sm. - - 149
Cerasi, Sm. - - 151
cerebrina, *DC.* - - 150
crassa, DC. - - 165
dendritica, *Ach.* - - 151
denigrata, Ach. - - 149
diaphora, Sm. - - 149
elegans, *Sm.* - - 150
epipasta, *Ach.* - - 148
fulvella, Ach. - - 149
hapalea, Ach. - - 149
herpetica? Ach. - 148
herpetica, β. Ach. - 148
lichenoides, Pers. - 149
lithyrga, Ach. - - 150
lyncea, *Borr.* - - 148
Lyellii, *Sm.* - - 151
marginata, Dub. - 151
microscopica, Sm. - 148
nimbosa? Ach. - - 149
nimbosa, Sm. - - 149
notha, Sm. - - - 149
notha, γ. Ach. - - 148
Persoonii, Ach. - - 150
Persoonii, β. Ach. - 181
Persoonii, Sm. - - 149
petræa, Ach. - - 150
phæa? Ach. - - 148
pulverulenta, Sm. - 151
rubella, *Pers.* - - 148
rufescens, *Pers.* - - 148
saxatilis, *DC.* - - 149
saxicola, Ach. - - 150
scripta, Ach. - - 151
serpentina, Sm. - - 151
siderella, Ach. - - 148
stenocarpa, Ach. - 149
tesserata, *DC.* - - 150
tridens, α. Ach. - - 149
tridens, β. Ach. - - 150
varia, *Pers.* - - 149
venosa, *Pers.* - - 152
vulgata, *Ach.* - - 149
Oreas elongata, Brid. - 24
ORTHOTRICHUM, *Hedw.* - 57
affine, *Schrad.* - - 58
anomalum, *Hedw.* - 57
anomalum, Sm. - 57
aristatum, *Sm.* - - 58
Brownii, Sm. - - 18
crispum, *Hedw.* - - 60
cupulatum, *Hoffm.* - 57
diaphanum, *Schrad.* - 58
Drummondii, *Hook.* - 58
Hutchinsiæ, *Sm.* - 60
Ludwigii, *Brid.* - - 60
Lyellii, *H. & T.* - - 59
nudum, Sm. - - 57
pulchellum, *Sm.* - - 60
pumilum, Sw. - - 58
rivulare, *Sm.* - - 59
rupincola, *Funck*, - 58
speciosum, *Nees*, - 59
strangulatum, Beauv. - 57
striatum, *Hedw.* - 59
striatum, Dav. - - 58
striatum, Hedw. - 59
OSCILLATORIA, *Vauch.* - 372

PAGE

? alata, *Carm.* - 378
autumnalis, *Ag.* - 380
chthonoplastes, *Hoffm.* 377
contexta, *Carm.* - 380
Corium, *Ag.* - 381
corticola, Carm. - 379
cyanea, *Ag.* - - 378
decorticans, *Grev.* - 379
Friesii, *Ag.* - - 377
limbata, *Grev.* - 379
limosa, *Ag.* - - 378
limosa, Grev. - 380
limosa, Hook. - 378
littoralis, *Carm.* - 379
lucifuga, *Harv.* - 377
muscorum, *Ag.* - 379
nigra, *Vauch.* - 380
ochracea, *Grev.* - 382
repens, Ag. - - 377
rupestris, *Ag.* - 381
spadicea, *Carm.* - 382
spiralis, *Carm.* - 381
splendida, *Grev.* - 378
subfusca, *Vauch.* - 381
subsalsa, *Ag.* ? - 380
tenax, Carm. - 381
tenuis, *Ag.* - - 378
tenuissima, *Ag.* - 377
torpens, Bory, - 396
turfosa, *Carm.* - 379
violacea, *Johnst.* - 381
viridis, Johnst. - 378

PALMELLA, *Lyngb.* - 400
adnata, *Lyngb.* - 402
Alpicola, Lyngb. - 400
botryoides, *Lyngb.* 400
cruenta, *Ag.* - 400
? cryptophylla, Carm. 399
frustulosa, Carm. 399
grumosa, *Carm.* - 401
hyalina, *Lyngb.* - 401
livida, *Carm.* - 401
montana, *Ag.* - 400
nivalis, Hook. - 399
protuberans, *Ag.* - 400
rivularis, *Carm.* - 401
rupestris, *Lyngb.* 401
? sanguinea, Ag. - 399
PADINA, *Adans.* - 285
deusta, *Hook.* - 285
parvula, *Grev.* - 286
Pavonia, *Lamour.* 285
PARMELIA, *Ach.* - 202
aleurites, *Ach.* - 207
ambigua, *Ach.* - 207
aquila, *Ach.* - - 207
Borreri, *Turn.* - 203
caperata, *Ach.* - 202
cæsia, Ach. - - 200
carneo-lutea, Turn. 195
Clementi, Turn. - 200
Clementiana, Ach. 200
conspersa, *Ach.* - 203
corrugata, *Ach.* - 205
cycloselis, *Ach.* - 206
diatrypa, *Ach.* - 208
elæina, Wahl. - 201
encausta, *Ach.* - 207
Fahlunensis, *Ach.* 206
glomulifera, *Ach.* 202
herbacea, *Ach.* - 204
incurva, *Hook.* - 206
lævigata, *Ach.* - 204
lanuginosa, Ach. 200
olivacea, *Ach.* - 204
omphalodes, *Ach.* 203
parietina, *Ach.* - 208
perforata, *Ach.* - 204
perlata, *Ach.* - 204
physodes, *Ach.* - 208

PAGE

pityrea, *Ach.* - 205
plumbea, Ach. - 201
pulverulenta, *Ach.* 205
rubiginosa, Ach. - 200
saxatilis, *Ach.* - 203
scortea, *Ach.* - 203
sinuosa, *Ach.* - 207
stellaris, *Ach.* - 205
speciosa, *Ach.* - 205
stygia, *Ach.* - - 206
tiliacea, *Ach.* - 204
velata, Turn. - 174
virella, *Ach.* - 206
Patellaria cerebrina, Dub. - - - 150
contigua, Hoffm. - 182
ulmicola, DC. - 190
PELTIDEA, *Ach.* - 218
aphthosa, *Ach.* - 219
canina, *Ach.* - 219
canina, β. Ach. - 220
horizontalis, *Ach.* 219
polydactyla, *Ach.* 220
rufescens, *Ach.* - 220
scutata, *Ach.* - 219
spuria, *Ach.* - - 219
venosa, *Ach.* - 219
Peltigera polydactyla, Hoffm. - - 220
sylvatica, Hoffm. 211
PERTUSARIA, *Ach.* - 164
ceuthocarpa, *Hook.* 164
communis, *DC.* - 164
crassa, *Hook.* - 164
fallax, *Ach.* - - 164
fallax, Ach. - 164
isidioides, *Hook.* - 164
Wulfenii, DC. - 164
PHASCUM, *L.* - - 6
acaule, Dill. - 7
acaulon, α. L. - 8
acaulon, β. L. - 8
alternifolium, *Dicks.* 6
axillare, *Dicks.* - 7
bryoides, *Dicks.* - 8
Carniolicum, Web. 8
crassinervium, *Schwaegr.* 7
crispum, *Hedw.* - 6
curvicollum, *Hedw.* 8
curvisetum, Dicks. 8
cuspidatum, *Schreb.* 8
elatum, Web. - 8
gymnostomoides, Brid. 8
multicapsulare, Sm. 6
muticum, *Schreb.* 7
nitidum, Hedw. - 7
pachycarpon, Schwaegr. 7
patens, *Hedw.* - 7
piliferum, Schreb. 8
rectum, *With.* - 8
recurvifolium, Dicks. 7
rostellatum, Brid. 7
Schreberianum, Dicks. 8
serratum, *Schreb.* 6
stoloniferum, Dicks. 6
strictum, Dicks. - 7
subulatum, *L.* - 7
PHYLLOPHORA, *Grev.* 303
rubens, *Grev.* - 303
PLACODIUM, *Fée*, - 201
canescens, *DC.* - 201
dedalæum, *Hook.* 202
microphyllum, *Hook.* 202
plumbeum, *Hook.* 201
Platygramma dendritica, Mey. - - 151
Lyellii, Mey. - 151
Pleuridium alternifolium, Brid. - - - 6
PLOCAMIUM, *Lamour.* 296
amphibium, Lamour. 299

PAGE

asparagoides, Lamour. 299
coccineum, *Lyngb.* 297
plumosum, Lamour. 311
vulgare, Lamour. 297
Pohlia elongata, Hedw. 66
minor, Schwaegr. 66
Pollia epiphylla, Corda, 131
POLYIDES, *Ag.* - 287
Griffithsiæ, Gaill. 305
lumbricalis, Ag. - 288
rotundus, *Grev.* - 288
POLYSIPHONIA, *Grev.* 331
Agardhiana, *Grev.* 335
atro-rubescens, *Grev.* 335
badia, *Grev.* - - 335
Brodiæi, *Grev.* - 332
byssoides, *Grev.* - 338
Carmichaeliana, *Harv.* 332
denudata, *Grev.* - 336
divaricata, Carm. 332
elongata, *Grev.* - 337
elongella, *Hook.* - 338
fastigiata, *Grev.* - 337
fibrata, *Hook.* - 333
fibrillosa, *Dillw.* - 338
fruticulosa, *Grev.* 331
furcellata, *Hook.* - 336
Lyngbyæi, *Harv.* 332
nigrescens, *Grev.* 336
parasitica, *Grev.* - 334
patens, *Grev.* - 334
Richardsoni, *Hook.* 337
rosea, Grev. - 337
spinulosa, *Grev.* 334
stricta, *Grev.* - 333
urceolata, *Grev.* - 334
violacea, *Grev.* - 336
Polysperma fluviatilis, Vauch. - - 326
POLYTRICHUM, *L.* - 52
affine, Funck, - 53
aloides, *Hedw.* - 54
alpestre, *Hoppe*, - 53
alpinum, *L.* - 54
arcticum, Sw. - 54
attenuatum, Menz. 53
aurantiacum, Hoppe, 54
commune, *L.* - 53
commune, β. L. - 53
commune, γ. L. - 52
Dicksoni, Turn. - 54
formosum, Hedw. 53
gracile, Menz. - 53
hercynicum, *Hedw.* 52
juniperinum, *Willd.* 53
longisetum, Sw. - 53
nanum, *Hedw.* - 55
pallidisetum, Funck, 54
piliferum, *Schreb.* 52
pumilum, Sw. - 55
remotifolium, Schwaegr. 53
rubellum, Menz. - 54
septentrionale, *Sw.* 53
sexangulare, Hoppe, 53
strictum, Menz. - 53
subrotundum, Menz. 55
sylvaticum, Menz. 54
undulatum, *Hedw.* 52
urnigerum, *L.* - 54
yuccæfolium, Ehrh. 53
Porina aggregata, Ach. 165
pertusa, Ach. - 164
saxicola, Ach. - 165
PORPHYRA, *Ag.* - 314
laciniata, *Ag.* - 314
linearis, *Grev.* - 315
? miniata, *Ag.* - 314
vulgaris, *Ag.* - 314
Prolifera crispa, Vauch. 356
PROTOCOCCUS, *Ag.* - 398
nivalis, *Ag.* - - 399

PAGE

PROTONEMA, *Ag.* - 387
Acharii, *Ag.* - 388
cryptarum, *Ag.* - 387
muscicola, *Ag.* - 387
Orthotrichi, *Ag.* - 387
umbrosum, *Ag.* - 387
PSORA, *Hoffm.* - 196
ambigua, Hoffm. - 207
atro-rufa, *Hook.* - 196
cæsia, Hoffm. - 200
cæruleo-nigricans, *Hook.* 196
coronata, Hoffm. - 186
decipiens, *Hoffm.* - 197
glebulosa, *Hook.* - 197
muralis, Hoffm. - 201
ostreata, Hoffm. - 196
paradoxa, Hoffm. - 196
? rubiformis, *Hook.* - 197
scalaris, *Hook.* - 196
vesicularis, Hoffm. - 196
Pterigophyllum lucens, Brid. - 78
Pterigynandrum filiforme, Hedw. - 74
gracile, Hedw. - 74
PTEROGONIUM, *Sw.* - 73
cæspitosum, Sm. - 74
filiforme, *Schwaegr.* - 74
gracile, *Sw.* - 74
? rotundifolium, Sm. - 85
sciuroides, *L.* - 75
Smithii, *Sw.* - 74
PTILOTA, *Ag.* - 311
plumosa, *Ag.* - 311
PUNCTARIA, *Grev.* - 282
latifolia, *Grev.* - 282
plantaginea, *Grev.* - 282
tenuissima, *Grev.* - 283
PYCNOTHELIA, *Dufour*, - 245
Papillaria, *Hook.* - 245
Pyrenula leucocephala, Ach. - 156
nigrescens, Ach. - 159
nitida, Ach. - 153
tessellata, Ach. - 157
umbonata, Ach. - 193

Racomitrion fontinaloides, Brid. - 51
RAMALINA, *Ach.* - 228
farinacea, *Ach.* - 229
fastigiata, *Ach.* - 229
fraxinea, *Ach.* - 229
pollinaria, *Ach* - 229
polymorpha, *Ach.* - 228
scopulorum, *Ach.* - 229
Raphidia natans, Carm. - 398
Rebouillia hemisphærica, Rad. - 108
RHODOMELA, *Ag.* - 298
dentata, Ag. - 297
Lycopodioides, *Ag.* - 298
pinastroides, *Ag.* - 298
scorpioides, *Ag.* - 298
subfusca, *Ag.* - 298
RHODOMENIA, *Grev.* - 292
bifida, *Grev.* - 293
ciliata, *Grev.* - 294
cristata, *Grev.* - 294
jubata, *Grev.* - 295
laciniata, *Grev.* - 293
palmata, *Grev.* - 295
Palmetta, *Grev.* - 294
polycarpa, *Grev.* - 293
reniformis, *Hook.* - 296
sobolifera, *Grev.* - 296
Teedii, Grev. - 305
RICCIA, *L.* - 102
capillata, Schmid. - 103
chrystallina, *L.* - 102
? fluitans, *L.* - 102

PAGE

fruticulosa, Dicks. - 131
glauca, L. - 102
minima, L. - 102
natans, *L.* - 103
spuria, *Dicks.* - 103
Ricciella fluitans, Braun, 102
RIVULARIA, *Roth*, - 393
angulosa, *Roth*, - 398
atra, *Roth*, - 395
applanata, *Carm.* - 402
botryoides, *Carm.* - 396
bullata, Berk. - 397
calcarea, *Sm.* - 396
crustacea, *Carm.* - 397
granulifera, *Carm.* - 397
hæmatitis, DC. - 396
nitida, *Ag.* - 397
Opuntia, Sm. - 313
Pisum, *Ag.* - 396
plana, *Harv.* - 398
plicata, *Carm.* - 396
tuberculosa, Sm. - 393
tuberiformis, Sm. - 394
vermiculata, Sm. - 381
verticillata, Sm. - 390
ROCCELLA, *Ach.* - 225
fuciformis, *DC.* - 226
tinctoria, *DC.* - 225
ROSARIA, *Carm.* - 375
globifera, *Carm.* - 376
lentigera, *Carm.* - 376

Sagedia rufescens, Ach. - 177
Sarcocyphos Ehrharti, Corda, - 114
SARGASSUM, *Ag.* - 268
bacciferum, *Ag.* - 268
vulgare, *Ag.* - 268
Schistidium cæspititium, Brid. - 11
ciliatum, Brid. - 15
imberbe, Brid. - 16
SCHISTOSTEGA, *Mohr.* - 16
osmundacea, Mohr. - 16
pennata, *H. & T.* - 16
SCHIZONEMA, *Ag.* - 416
apiculatum, Ag. - 415
comoides, - 417
corymbosum, *Ag.* - 417
Dillwynii, *Ag.* - 416
Grevillii, *Ag.* - 417
helminthosum, *Chauv.* 416
obtusum, *Grev.* - 417
prostratum, *Grev.* - 418
quadripunctatum, *Ag.* 416
Smithii, *Ag.* - 417
spadiceum, *Grev.* - 416
SCYPHOPHORUS, *Fée*, - 240
alcicornis, *Hook.* - 242
anomæus, *Hook.* - 242
cæspititius, *Hook.* - 240
cervicornis, *Hook.* - 242
cocciferus, *Hook.* - 244
cornutus, *Hook.* - 243
deformis, *Hook.* - 244
digitatus, *Hook.* - 244
endiviæfolius, *Hook.* - 242
filiformis, *Hook.* - 243
fimbriatus, *Hook.* - 243
gracilis, *Hook.* - 243
microphyllus, *Hook.* - 241
parasiticus, *Hook.* - 241
pyxidatus, *Hook.* - 242
radiatus, *Hook.* - 243
sparassus, *Hook.* - 241
SCYTHYMENIA, *Ag.* - 404
rupestris, *Ag.* - 405
Scytochloria nitida, Harv. 397
plana, Harv. - 398
compressus, γ. Lyngb. 320
compressus, *var.* Lyngb. 318

PAGE

erectus, Lyngb. - 318
fæniculaceus, Ag. - 283
Filum, Ag. - 380
Filum, *var.* γ. Ag. - 281
Filum, *var.* Ag. - 381
fistulosus, Lyngb. - 281
SCYTONEMA, *Ag.* - 370
Bangii, Lyngb. - 377
byssoideum, *Ag.* - 370
cirrhosum, *Carm.* - 370
compactum, *Ag.* - 368
contextum, *Carm.* - 370
crustaceum, Ag. - 369
hydnoides, Carm. - 373
minutum, *Ag.* - 369
myochrous, *Ag.* - 369
myochrous, β. Ag. - 368
ocellatum, *Harv.* - 368
ocellatum, Lyngb. - 369
panniforme, Carm. - 367
Scytosiphon castaneus, Carm. - 281
hippuroides, Lyngb. - 305
intestinalis, γ. Lyngb. - 317
intestinalis, Lyngb. - 318
paradoxus, Œd. - 319
Solenia Bertoloni, Ag. - 318
clathrata, Ag. - 319
clathrata, α. Ag. - 319
clathrata, *var.* Ag. - 318
compressa, Ag. - 318
echinata, Carm. - 319
intestinalis, Ag. - 318
intestinalis, *var.* Ag. - 318
Linza, Ag. - 315
percursa, Ag. - 320
SOLORINA, *Ach.* - 218
crocea, *Ach.* - 218
saccata, *Ach.* - 218
SPHACELARIA, *Lyngb.* - 327
cirrhosa, *Ag.* - 328
cirrhosa, *var.* Ag. - 328
disticha, *Lyngb.* - 327
filicina, *Ag.* - 327
fusca, *Ag.* - 328
hypnoides, Grev. - 327
olivacea, *Ag.* - 328
pinnata, Lyngb. - 328
plumosa, *Lyngb.* - 328
racemosa, *Grev.* - 329
radicans, *Hook* - 328
scoparia, *Lyngb.* - 327
velutina, *Grev.* - 329
SPHÆROCARPUS, *Mich.* - 103
terrestris, *Sm.* - 103
Sphæria epigæa, Pers. - 159
gregaria, Weig. - 171
leucocephala, Ehrh. - 156
lichenoides, Sow. - 156
muralis, Sow. - 158
nitida, Weig. - 153
sphincterica, Sow. - 142
SPHÆROCOCCUS, *Stackh.* - 308
acicularis, Ag. - 304
bifidus, Ag. - 293
Brodiæi, Ag. - 307
cartilagineus, Ag. - 308
ciliatus, Ag. - 295
ciliatus, *vars.* Ag. - 295
compressus, Ag. - 303
confervoides, Ag. - 303
corneus, Ag. - 309
corneus, *var.* Ag. - 309
corneus, *var.* Ag. - 309
coronopifolius, *Ag.* - 308
crispus, Ag. - 306
cirrhatus, Ag. - 294
? erectus, Grev. - 304
Griffithsiæ, Ag. - 305
jubatus, Grev. - 295
lichenoides, Grev. - 304

PAGE

mammillosus, Ag. - 306
membranifolius, Ag. - 307
Palmetta, Ag. - - 294
plicatus, Ag. - - 305
polycarpus, Grev. - 293
purpureus, Ag. - - 303
rubens, Ag. - - - 307
Teedii, Ag. - - - 305
SPHÆROPHORON, *Ach.* - 236
compressum, *Ach.* - 236
coralloides, Ach. - - 236
coralloides, *T. & B.* - 236
fragile, Ach. - - 236
SPHAGNUM, *L.* - - 8
acutifolium, *Ehrh.* - 9
alpinum, L. - - - 42
arboreum, L. - - 77
capillifolium, Hedw. - 9
compactum, Schwaegr. 9
cuspidatum, *Ehrh.* - 9
cymbifolium, Sw. - - 9
immersum, Brid. - - 9
latifolium, Hedw. - 9
latifolium, β. Turn. - 9
obtusifolium, *Ehrh.* - 9
palustre, α. L. - - 9
palustre, β. L. - - 9
squarrosum, *Web.* - 9
SPILOMA, *Ach.* - - - 168
auratum, *Ach.* - - 169
decolorans, *T. & B.* - 170
dispersum, *T. & B.* - 169
fuliginosum, *T. & B.* - 170
gregarium, *T. & B.* - 171
melaleucum, Ach. - 170
microclinium, Sw. - 170
microscopicum, *T. & B.* 169
murale, *T. & B.* - - 169
nigrum, *T. & B.* - - 170
paradoxum, Ach. - 147
punctatum, *T. & B.* - 169
sphærale, *Ach.* - - 169
tricolor, Ach. - - 169
? tuberculosum, *Sm.* - 171
tumidulum, Ach. - 147
tumidulum, Ach. - 171
variolosum, Sm. - - 170
versicolor, Ach. - - 170
Vitiligo, Ach. - - 172
SPLACHNUM, *L.* - - 18
ampullaceum, *L.* - - 19
angustatum, *L. fil.* - 19
Brewerianum, Hedw. - 19
fastigiatum, Dicks. - 19
Frælichianum, *Hedw.* - 20
Frælichianum, With. - 10
gracile, Dicks. - - 19
lingulatum, Dicks. - 21
mnioides, *L. fil.* - - 19
ovatum, Hedw. - - 19
reticulatum, Sm. - - 20
rugosum, Dicks. - - 19
rugosum, Sm. ? - - 20
serratum, Hedw. - 19
sphæricum, *L. fil.* - 18
tenue, *Dicks.* - - 19
Turnerianum, Dicks. - 20
urceolatum, Dicks. - 19
urceolatum, β. Wahl. - 19
vasculosum, Hedw. - 20
Wulfenianum, Schwaegr. 60
Spongodium Bursa, Lamour. - - - 322
tomentosum, Lamour. - 322
SPOROCHNUS, *Ag.* - - 278
aculeatus, Ag. - - 277
ligulatus, Ag. - - 277
pedunculatus, *Ag.* - 278
rhizodes, *Ag.* - - 279
villosus, *Ag.* - - 278
viridis, Ag. - - - 278

PAGE

SPYRIDIA, *Harv.* - - 340
filamentosa, *Harv.* - 341
SQUAMARIA, *DC.* - - 197
affinis, *Hook.* - - 200
cæsia, *Hook.* - - 200
candelaria, *Hook.* - 198
candicans, *Hook.* - - 199
circinnata, *Hook.* - 200
Clementi, *Hook.* - - 200
crassa, *DC.* - - - 197
elæina, *Hook.* - - 201
elegans, *Hook.* - - 199
fulgens, *Hook.* - - 199
gelida, *Delise*, - - 199
hypnorum, *Hook.* - 198
lanuginosa, *Hook.* - 200
lentigera, *DC.* - - 199
leucolepis, *Hook.* - - 198
miniata, *Hook.* - - 199
murorum, *Hook.* - - 198
muscorum, *Hook.* - 198
saxicola, *Hook.* - - 201
tribacia, *Hook.* - - 198
STEREOCAULON, *Ach.* - 237
botryosum, *Ach.* - - 237
Cereolus, *Ach.* - - 237
cereolinum, Ach. - 237
condyloideum, *Ach.* - 237
confine, Ach. - - 274
nanum, *Ach.* - - 237
paschale, *Ach.* - - 237
STICTA, *Ach.* - - - 208
aurata, *Ach.* - - 209
crocata, *Ach.* - - 209
fuliginosa, *Ach.* - - 210
limbata, *Ach.* - - 210
macrocarpa, Delise, - 209
macrophylla, *Fée*, - 209
pulmonacea, Ach. - 210
pulmonaria, *Ach.* - 210
scrobiculata, *Ach.* - 210
sylvatica, *Ach.* - - 211
Stigmatidium crassum, Dub. - - - 165
obscurum, Spr. - - 165
STIGONEMA, *Ag.* - - 367
atro-virens, *Ag.* - - 367
mammillosum, *Ag.* - 367
panniforme, *Harv.* - 367
STRIARIA, *Grev.* - - 281
attenuata, *Grev.* - - 281
STYLLARIA, *Ag.* - - 412
cuneata, *Ag.* - - 412
Swartzia capillacea, Hedw. - - - 35
inclinata, Hedw. - - 32
trifaria, Hedw. - - 34
Syncollesia ? melæna, Ag. - - - - 381
Syntrichia lævipila, Brid. 49
ruralis, Brid. - - 49
subulata, Mohr. - - 49

TARGIONIA, *Mich.* - - 105
hypophylla, *L.* - - 105
sphærocarpa, Dicks. - 103
TETRAPHIS, *Hedw.* - - 18
Browniana, *Grev.* - 18
ovata, Sm. - - - 18
pellucida, *Hedw.* - - 18
TETRASPORA, *Link*, - 317
gelatinosa, *Desv.* - - 317
lubrica, *Ag.* - - - 317
Tetrodontium Brownianum, Schw. - - 18
THELOTREMA, *Ach.* - - 105
clausum, Schær. - - 166
? exanthematicum, *Ach.* 165
Hutchinsiæ, *Borr.* - 166
hymeneum, Ach. - - 164
lepadinum, *Ach.* - - 165

PAGE

melaleucum, *T. & B.* - 165
variolarioides, β. Ach. 175
Thysanomitrion flexuosum, Arn. - - - 42
TIMMIA, *Hedw.* - - 70
Austriaca, Hedw. - 70
cucullata, Mich. - - 70
Megapolitana, *Hedw.* - 70
TORTULA, *Hedw.* - - 47
acuminata, Sw. - - 49
aristata, Sm. - - 49
barbata, Sm. - - 50
brevifolia, Sm. - - 51
brevirostris, *Hook.* - 47
convoluta, *Sw.* - - 48
cuneifolia, *Turn.* - - 50
enervis, *Hook.* - - 47
ericetorum, Sm. - - 50
fallax, *Sw.* - - - 50
gracilis, *Hook.* - - 51
humilis, Turn. - - 50
imberbis, Sm. - - 51
muralis, *Hedw.* - - 48
nervosa, Sm. - - 48
revoluta, *Brid.* - - 48
rigida, *Turn.* - - 47
rigida, Funck, - - 47
rigida, Sm. - - - 47
ruralis, *Sw.* - - - 49
stellata, *Sm.* - - 50
subulata, *Hedw.* - - 49
tortuosa, *Hedw.* - - 50
unguiculata, *H. & T.* - 49
unguiculata, Turn. - 51
Tremella adnata, Huds. ? 402
cruenta, Sm. - - 403
diffórmis, L. - - 394
granulata, Huds. - 325
lichenoides, L. - - 217
Nostoc, Sm. - - - 403
verrucosa, L. - - 404
TRENTEPOHLIA, *Ag.* - 386
aurea, *Ag.* - - - 386
pulchella, *Ag.* - - 386
purpurea, *Ag.* - - 386
TRICHOSTOMUM, *Hedw.* - 36
aciculare, *Beauv.* - 38
brachydontium, Bruch, 34
canescens, *Hedw.* - 37
capillaceum, Sm. - 35
cirrhatum, Sm. - - 35
crispulum, Bruch, - 34
cylindricum, Hedw. - 36
ellipticum, *H. & T.* - 38
ericoides, Schrad. - 36
fasciculare, *Schrad.* - 38
flexifolium, Sm. - - 33
fontinaloides, Hedw. - 51
funale, *Schwaegr.* - 36
glaucescens, Hedw. - 33
heterostichum, *Hedw.* - 36
lanuginosum, *Hedw.* - 36
latifolium, Schwaegr. - 41
lineare, Sm. - - 33
linoides, Sm. - - 34
microcarpum, *Hedw.* - 37
papillosum, Sm. - - 33
patens, *Schwaegr.* - 36
patens, β. Hook. - - 36
piliferum, Sm. - - 41
polyphyllum, *Schwaegr.* 38
pusillum, Hedw. - - 35
rigidulum, Sm. - - 31
riparium, Web. - - 38
sciuroides, Mohr, - - 74
Sudeticum, Funck, - 37
trifarium, Sm. - - 34
Tuberculatia fusca, Hoffm. - - - 241
TYNDARIDEA, *Bory*, - 365
bicolor, *Harv.* - - 365

	PAGE
cruciata, *Harv.*	365
epigæa, *Harv.*	365
pectinata, *Harv.*	365
ULVA, *L.*	314
articulata, β. Huds.	313
atomaria, Woodw.	284
bullosa, *Roth*,	316
? calophylla, *Spreng.*	316
clathrata, Ag.	319
compressa, L.	318
crispa, *Lightf.*	316
dichotoma, Huds.	284
edulis, DC.	312
fœtida, Sm.	418
filiformis, Œd.	313
furcellata, Turn.	312
furfuracea, Horn.	316
fistulosa, Huds.	281
gelatinosa, Vauch.	317
granulata, L.	325
incrassata, Œd.	313
incrassata, Sm.	393
intestinalis, L.	318
Lactuca, *L.*	315
Lactuca, Sm.	315
Lactuca, *var.* Lightf.	315
Lactuca, β. Huds.	316
Lactuca, γ. Huds.	316
latissima, *L.*	315
ligulata, Woodw.	312
Linza, *L.*	315
lubrica, Roth,	317
maxima, Gunn.	276
miniata, Lyngb.	314
montana, Lightf.	400
multifida, Sm.	285
palmata, Lyngb.	295
Pavonia, L.	285
pisiformis, Huds.	404
plantaginea, Roth,	292
plantaginea, *var.* Lyngb.	281
plumosa, Huds.	322
prolifera, Œd.	318
protuberans, Sm.	400
pruniformis, Sm.	398
punctata, Stackh.	291
purpurascens, Sm.	313
purpurea, Roth,	314
purpurea, *var.* Lyngb.	315
ramulosa, Sm.	319
rubens, Huds.	391
rubra, Huds.	312
rupestris, Sm.	405
spongiformis, *Œd.*	313
terrestris, Roth,	316
Turneri, Sm.	281
umbilicalis, Lightf.	314
umbilicalis, Sm.	314
UMBILICARIA, *Fée*,	223
ænea, α. Schær.	221
ænea, γ. Schær.	222
congesta, Hoffm.	251
crinita, Hoffm.	222
depressa, β. Schær.	223
depressa, B. Schær.	223
erosa, Hoffm.	215
flocculosa, Hoffm.	219
polymorpha, *a.* Schær.	222
polymorpha, F. Schær.	222
polymorpha, β.	221
polyphylla, Schrad.	221
pustulata, *Schrad.*	223
URCEOLARIA, *Ach.*	175
Acharii, *Ach.*	176
agelæa, Ach.	175
calcarea, *Ach.*	176
cinerea, *Ach.*	176
diacapsis, Ach.	177
fimbriata, Ach.	176
gibbosa, *Ach.*	176
Hoffmanni, Ach.	176
rufescens, *Borr.*	177
scruposa, *Ach.*	176
Uredo nivalis, Bauer,	395
USNEA, *Ach.*	230
barbata, *Ach.*	231
florida, *Ach.*	230
ochroleuca, Hoffm.	233
plicata, *Ach.*	230
VARIOLARIA, *Pers.*	172
agelæa, *T. & B.*	175
amara, c. Ach.	175
Aspergilla, *Ach.*	174
argæna, *T. & B.*	175
cinerea, *Sm.*	174
communis, g. Ach.	174
communis, b. Ach.	173
conspurcata, *T. & B.*	172
corallina, Ach.	235
discoidea, *Pers.*	173
faginea, *Pers.*	173
globulifera, *Turn.*	173
glomulifera, Ach.	173
griseo-virens, *T. & B.*	172
lactea, *Pers.*	174
multipunctata, *T. & B.*	174
velata, *Ach.*	174
Vitiligo, *T. & B.*	172
VAUCHERIA, *DC.*	323
aquatica, Lyngb.	389
cæspitosa, *Ag.*	325
dichotoma, *Ag.*	323
Dillwynii, *Ag.*	324
geminata, *DC.*	324
granulata, Lyngb.	325
marina, *Lyngb.*	323
ornithocephala, *Ag.*	324
radicata, Ag.	325
sessilis, *DC.*	324
terrestris, *DC.*	324
velutina, *Ag.*	323
VERRUCARIA, *Pers.*	152
acrotella, Ach.	159
alba, Schrad.	154
albo-atra, Hoffm.	184
analepta, Ach.	153
Aphanes, *Borr.*	155
biformis, *Borr.*	154
carpinea, Ach.	154
cinerea, *Pers.*	153
concinna, *Borr.*	156
coronata, Hoffm.	186
dermatodes, *Borr.*	153
elæina, *Borr.*	156
epidermidis, *Ach.*	153
epigæa, *Ach.*	159
euploca, Borr.	161
epipolæa, *Ach.*	158
fallax, Pers.	164
Gagei, *Borr.*	157
geminata, *Ach.*	154
Harrimanni, *Ach.*	157
Hookeri, *Borr.*	159
immersa, Hoffm.	156
impolita, Hoffm.	147
isidioides, Borr.	164
lacte-virens, Borr.	162
lævata, *Ach.*	157
leucocephala, *Ach.*	156
maura, *Ach.*	158
muralis, *Ach.*	158
nigrescens, *Pers.*	158
nitida, *Schrad.*	153
niveo-atra, *Borr.*	155
olivacea, *Pers.*	154
plumbea, *Ach.*	157
psoromoides, Borr.	161
punctiformis, *Pers.*	154
rhyponta, *Ach.*	154
rudis, *Borr.*	155
rupestris, *Schrad.*	156
Schraderi, Ach.	156
sorediata, Borr.	162
stigmatella, *Ach.*	153
striatula, *Ach.*	159
sulphurea, Hoffm.	185
thelostoma, Ach.	193
trachona, *Ach.*	158
umbrina, Ach.	159
viridula, *Ach.*	157
Webera alpina, Funck,	62
nutans, Hedw.	61
pyriformis, Hedw.	60
WEISSIA, *Hedw.*	23
acuta, *Hedw.*	28
affinis, *H. & T.*	24
calcarea, *Hedw*	27
capillacea, Schwaegr.	27
cirrhata, *Hedw.*	25
compacta, Hoppe,	24
controversa, *Hedw.*	26
crispula, *Hedw.*	26
curvirostra, *H. & T.*	26
denticulata, Schwaegr.	25
elongata, *Hoppe*,	23
fugax, Hedw.	25
lanceolata, *H. & T.*	24
latifolia, *Schwaegr.*	24
microdus, Schwaegr.	26
Mielichoferiana, Funck,	24
nigrita, *Hedw.*	23
nuda, *H. & T.*	23
pusilla, *Hedw.*	27
recurvata, *H. & T.*	27
recurvirostra, Hedw.	26
rupestris, Hedw.	28
Schisti, Schwaegr.	25
splachnoides, Schwaegr.	21
Starkeana, *Hedw.*	26
stricta, *H. & T.*	25
Templetoni, H. & T.	55
tenuirostris, *H. & T.*	25
trichodes, *H. & T.*	25
verticillata, *Schwaegr.*	27
Zonaria atomaria, Ag.	284
deusta, Ag.	285
? *dichotoma*, Ag.	284
? *dichotoma*, β. Ag.	284
multifida, Ag	285
Pavonia, Ag.	285
? *plantaginea*, Ag.	292
? *plantaginea*, *var.* Ag.	278
? *tenuissima*, Ag.	283
ZYGODON, *H. & T.*	56
conoideus, *H. & T.*	56
ZYGNEMA, *Ag.*	364
condensatum, Ag.	364
cruciatum, Ag.	364
curvatum, *Ag.*	365
deciminum, *Ag.*	366
decussatum, Ag.	365
epigæum, Carm.	365
gracile, Ag.	365
littoreum, Lyngb.	357
longatum, Ag.	366
nitidum, *Ag.*	366
pectinatum, Ag.	365
quininum, *Ag.*	366

THE END.

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Parmelia herbacea
Sticta pulmonaria

Cladonia rangiferina Reindeer moss
——— fyxidata Common
——— cornuta Horned
Cryptophorus coccifera Scarlet cup Lichen