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I. Irish Hepaticæ

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3. Abortive ovules inferior. Maturation biennial.
 - a. Leaves caducous. *Q. falcata, ilicifolia, rubra, Phellos, Xalapensis, calophylla, &c.*
 - b. Leaves persistent. *Q. acutifolia, aquatica, Castanea, cinerea.*

This last subdivision passes into the other sections of the genus *Quercus*; and I repeat, that independent of this arbitrary classification of the species of the principal section, all the sections themselves, and all the genera, depend on a truly natural combination of characters.

Mr Naylor exhibited specimens of the *Peloria* variety of *Linaria vulgaris*, and a peculiar abortive state of the same plant.

Specimens were exhibited of *Sarracenia purpurea*, a plant which has been of late used in cases of small-pox. The experience of medical men in Edinburgh seems to lead to the conclusion that the so-called remedy is of little or no value. Specimens of *Sarracenia variolaris* were also shown. The plant receives its name not from any qualities in reference to *variola* (small-pox), but from the smallpox-like markings on the outside of the upper part of its pitchers.

8th January 1863.—Professor MACLAGAN, President, in the Chair.

The following donations to the Society's Library were laid on the table:—

The Canadian Naturalist and Geologist, Vol. VII., No. 5.—From the Montreal Natural History Society.

Proceedings of the Royal Horticultural Society, Vol. III., No. 1.—From the Society.

An Appeal to Physiologists and the Press, by H. Freke, M.D.—From the Author.

Notice of a Mass of Meteoric Iron, by Dr John Alex. Smith.—From the Author.

History and Description of Needle Making, by Michael T. Morrall.—From the Author.

Report by the Jury on the Vegetable Substances used in Manufactures, exhibited in the National Exhibition of 1862.—From Professor Archer.

Atti della Societa Elvetica della Scienze Naturali riunita in Lugano, 1860.—From the Society.

Compte Rendu de la 43^{me} session de la Société Suisse des Sciences Naturelles, 1861.—From the Society.

On *Hydrilla verticillata*, by Robert Caspary.—From the Author.

The following donations to the Herbarium were announced:—

From G. Munby, Esq.—Three hundred named specimens of Algerian dried Plants.

From Mr John Robertson, Glasgow—Specimens of *Lycopodium inundatum* from near Dunkeld.

From Dr Carrington—New and rare Irish *Hepaticæ*.

The following donations to the Museum at the Botanic Garden were noticed:—

From William Rashleigh, Esq.—Fruit of *Benthamia fragifera*, grown and ripened in the open air at Menabilly, Fowey, Cornwall.

From Mrs Cundell, Leith—Hat made from the fibre of the American Aloe.

From Miss Riddell—Specimen of *Stigmara*, enclosing stem of *Lepidodendron*, collected at Craighleith in 1833.

From Mrs Bocklesby Davis, per Rev. D. T. K. Drummond—Fruit plate, made from the wood probably of a species of *Ficus*, with carving representing the foliage of the vine.

From Dr J. E. T. Aitchison—Cord made from the fibre of *Saccharum Munjia*, in Lahore jail, Punjab.

From S. C. Mackenzie, Esq.—Wax model of fruit of Mango.

From Archibald Hewan, Esq., Old Calabar—Box of beans of *Physostigma venenosum* (Calabar ordeal bean).

Professor Archer presented specimens of fungi from British Guiana—Contributed by Sir William W. Holmes.

From John Mackay, Esq.—Specimens of the flowers of *Pyrethrum roseum*.

The following communications were read:—

I. *Irish Hepaticæ*. By BENJAMIN CARRINGTON, M.D., F.L.S.
(Plates X. and XI.)

I have added to the specimens collected by myself some rare stations of *Hepaticæ* observed by Mr D. Moore, of Glasnevin, and of species growing in the neighbourhood of Cork, by Mr A. Carroll. Mr W. Wilson has

afforded me valuable assistance in the identification of Dr Taylor's species. Lastly, I have great pleasure in recording my obligations to Dr Gottsche of Altona, who carefully named a set of specimens for me, and by the liberal information contained in his letters, and his thorough acquaintance with everything relating to the Hepaticæ, has enabled me to make this paper much more perfect than it could otherwise have been.

It would afford me pleasure if the following notes should induce any observers to investigate the morphological features of the Cryptogamia.

The form of the cells frequently assists us in the determination of nearly allied species. Take for example *Jung. scalaris* (Pl. X. fig. vi.), which, in a barren state, is likely to be confounded with several of the entire-leaved Hepaticæ, but which may always be recognised by the peculiar bodies contained in the cells.

For these examinations a power of 300 diameters is most useful. The form of the cells, in many instances, may be made out without recourse to reagents, but in others this is not the case. The mode of preparation which I have found most effective, and which is followed by *Dr Gottsche*, and other observers, is the following:—"Take a leaf, if dry, previously steeped in water, place between two slips of glass, with a few drops of equal parts of Liquor Potassæ and water; warm over a spirit-lamp until ebullition, then wash the leaf in water, place on a fresh slip, and add a drop of iodide of zinc solution, and put on the cover."

The preparations thus obtained are amongst the most beautiful of microscopic objects; and the physiologist cannot but be delighted with the precision with which the different layers of the cell are mapped out.

The Liquor Potassæ causes the inner wall to contract upon its contents, renders the whole more transparent, and dissolves the epidermic layer and connecting tissue binding the cells together.

The outer wall appears as a white line separating the cells, thickened at the angles by a hyaline deposit, the "trigonum interstitiale" of authors (Pl. XI. figs. 3-5). It is uncoloured by the iodide of zinc, although in some works that substance is said to strike a blue colour with the cellulose membrane. Professor Schacht looks upon the white line as "materia intercellularis;" but there can be no doubt that it represents the common wall of the cell.

The violet-coloured figure within this is the contracted "*membrana secundaria*," which assumes a lobed stellate form, from the projecting arms of the included "*saccus primordialis*" of Mohl. The nucleus seems to be the centre of vital and nutritive activity, and the projecting radii, which approach others in the adjacent cells, doubtless serve to keep up the communication between one and another. The outer cellulose coat is a mere protective secretion like the shells of molluscs. "Hence the development of the cell-coat, as a product of cellular activity, always stands in inverse proportion to the physiological activity of the cell. In youth thin, soft, and extensible, the cell-coat allows abundant nutrition and advancing growth; subsequently thickened, and therewith hardened by the deposits of lamellæ, it compresses the contents within continually narrower boundaries, more and more excludes intercourse with the external world, and puts a term to growth."—*Dr Braum*, Ray Soc. Memoirs, 1853.

I. RICCIÆ.

Riccia glauca, L. Mud walls, Ross Bay.

II. ANTHOCEROTÆ.

Anthoceros punctatus. Moist banks near Kenmare. Brandon Mountain; *W. Wilson*.

III. MARCHANTIEÆ.

Lunularia vulgaris, Mich.

Near Kenmare! Ballilicky, *W. Wilson*.

Marchantia polymorpha, L. Frequent on moist rocks, but seldom fruiting.

Preissia commutata, N. ab E. (Eng. Bot., t. 2545.)

Ravine below Eagle's Nest; Dunkerron with ♂ flowers, Dr Taylor; and Kenmare, ♂ and ♀, W. Wilson.

Reboulia hemisphærica, Raddi. Dingle Bay! Dunkerron, Dr Taylor; limestone rocks near Cork and Fermoy, J. Carroll.

This is the plant figured in Eng. Bot., t. 503 (1886, 2d ed.), according to the magnified portion. In the Eng. Flora it is treated as the third variety of *M. hemisphærica*, while *P. commutata* is considered the typical form. It is easily distinguished by the deeply-divided 4-5-fid receptacle, which is barbate beneath, and at the base of the peduncle, and by the sessile antheridia; whereas the receptacle of *Preissia* is marked on the top with a cruciate crest, obtusely four-lobed, and the ♂ plant is pedunculate.

Fegatella conica, Corda.

Common by waterfalls. In a small cave beneath Eagle's Nest there was a slender variety, with remarkably narrow fronds.

Dumortiera irrigua, Tayl. (*Rabenhorst, Hep. Europ.*, No. 204.)

Frequent on moist rocks about Killarney, but nowhere in such luxuriance as at Torc Cascade. There were abundance of young fertile plants, but no mature capsules. This species also grows at Brandon Mountain, W. Wilson; and in very wet places near Cork, A. Carroll. No ♂ plants were observed.

IV. JUNGERMANNIÆ.

A. Frondosæ.

Fossombronina angulosa, Raddi. Cliffs near Ross Bay! Caves, Dingle Bay, D. Moore.

This is a much finer plant than *F. pusilla*, although not easy to define, forming wide, shallow patches, branched dichotomously, of a delicate translucent green, the stem broad and purple, clothed with radicles of the same colour. The leaves are a line or more broad, obtusely lobed, horizontal; calyx campanulate, crenate. The spores are covered with short spines, as in *F. pusilla*. It seems partial to the seaside. I have received plants from Anglesey, Penzance, Jersey, &c.

Petalophyllum Ralfsii, Gottsche. On sand flats, Malahide; with capsules, D. Moore!

The figures 15, 16, Eng. Bot., t. 2750, belong to this species. The reniform lamellate fronds are very characteristic.

Mörckia hibernica, Gottsche, in *Rabenhorst's Hepaticæ*, No. 121.

α. Hookeriana, G. (*Jung hibernica*, Hook. Jung., t. 78.) Lough Bray, Miss Hutchins.

β. Wilsoniana, G. (Eng. Bot., t. 2750, figs. 1-14.) Sand flats, Malahide, ♂ and ♀. D. Moore!

In the Synop. Hepat., p. 475, *J. hibernica* is made the var. γ of *Blyttia Lyellii*, Endl. Dr Gottsche, in a letter, gives the following reason for placing it in a separate genus:—"Mörckia has no nerve; *Blyttia* has a nerve. Boil *J. Lyellii* in a little Liquor potassæ, and you will readily separate the nerve, with its long fibres, ligneous, as Hooker describes them (Br. Jung., t. 77). You may easily see them in a transverse section. In *Mörckia* all the cells are alike, and no midrib with ligneous fibres is present." For further remarks upon the nerve, see the note to *Aneura pinguis*.

Pellia epiphylla (L.), *N. ab. E.* Very common.

P. calycina, *Tayl.* Frequent, Torc Cascade! Cromaglan.

Aneura pinguis, *Dumort.*

Damp ravines and waterfalls, Killarney. Frequent! Fruit rare.

Mr Mitten seems to hold original views respecting the morphology of the Hepaticæ. In the *Flora Novæ Zeelandiæ*, p. 167, we find the remark under "*Sarcomitrium*.—This genus contains all the *Aneuræ*, and part of the *Metzgeriæ* of the *Synops. Hepat.*, where the fronds have been described as nerveless, though consisting of *very little beside the nerve*. In *S. pingue*, and the wide-lobed species, there is but a single row of cells on each side of the nerve, to represent the leafy tissue of the plants. *Aneura being therefore inapplicable*, *Sarcomitrium* has been adopted as the better generic name."

The question here rests upon the meaning Mr Mitten affixes to the term "nerve." If we are to understand by it any thickening of the cellular tissue towards the mesian line, then all the frondose species must be considered nerved, as there are always a greater number of cells along the centre of a frond—*e.g.*, in *Pellia*, *Dumortiera*, &c. Dr Hooker describes *J. pinguis*, "*frondo enervi car-nosa*," and only uses the term nerve as synonymous with the stems of the foliose species: "What I have said of the stems of the folia-ceous *Jungermanniæ*, applies equally to the species *Frondosæ*, except that in them the *stems*, or nerves as they are called in these, are rarely cylindrical." In fact, the nerve, rightly understood, should mean a fibrous support, not a mere cellular expansion.

A. *pinnatifida*, *N. ab. E.* (*J. sinuata*, Dicks.) Very frequent about waterfalls; Torc Cascade; growing with *Frul. Hutchinsia*, *Fermoy*, *T. Chandler*.

A. *multifida*, *Dumort.* (Hook. Jung., t. 45, figs. 4, 5, &c.)

α. *major*, *Nees*. On rocks in streams, Eagle's Nest! Cromaglan, Glena! Some of the forms are scarcely at all thickened, and seem to connect it with *A. pinnatifida*.

β. *ambrosioides*, *Nees*. Running among wet moss, Cromaglan, Glensiskin, Cork, *T. Chandler*.

There is much difference in the breadth and ramification of the fronds. Some of the specimens are very rigid and opaque, the fronds slender, and distinctly pinnate.

γ. *filiformis*, *Nees*. Growing in loose balls in boggy places, Westmeath, *D. Moore*.

A. *palmata*, *N. ab. E.* (*Rab. Hepat.*, n. 201-3.) γ polyblasta, et γ² conferta. On dead trees, &c., Cromaglan, Torc Mountain, Eagle's Nest, Glengarriff, Co. Mayo, *D. Moore*.

Metzgeria, *Raddi*.

M. *furcata* (L.), *Nees*. Very abundant and variable. δ æruginosa, *Mucross*.

B. *Folioseæ*.

I. Leaves *Succubous*, lying beneath the stem, *dextrosal*.

Gymnomitrium crenulatum, *Gottsche* (*in schd*). Pl. X. fig. v. Stems creeping; branches attenuate, arcuate; leaves bifariously imbricated, erect, ovate emarginate; the margin scarious crenulate.

G. *coralloides*, *fide Dr Taylor*. Mountain districts of Ireland; on rocks near the tunnel, Cromaglan! Dunkerron, and Knockavohila, *Dr Taylor*; Carrantuoil, *D. Moore*! Lugnaquilla, Co. Wicklow, and Galtymore, *A. Carroll*.

Patches dark brown, or nearly black, forming extensive depressed tufts. Stems rhizomatous; branches ascending or prostrate, lanceolate, rigid, terete, or somewhat compressed. Leaves dark brown, scarcely broader than the stem, ovate, very convex, emarginate, with a broad scarioso border; cells minute, discrete, hexagonal,—those of the margin hyaline, erose-dentate. (Fig. 8.)

Fertile stem short (fig. 3); the perichætium ovate-acute, of about three pairs of leaves, much larger than the rest; upper leaves involute, enclosing the archegonia. Within these we find one or two smaller leaves, 2-3-fid at the apex, and with larger rhomboid areolæ (fig. 6, 7). Archegonia oblong, pale, striated (fig. 7). Calyptra oval, delicately reticulated, surmounted by the narrow style (fig. 6). Capsule buff-coloured, round; the valves ovate, punctate, not opening quite to the base (fig. 6). Elaters rather short, brown, bispiral. Spores minute (fig. 10).

Antheridia situated at the end of the barren stems (fig. 4), one in each tumid leaf (fig. 9).

This plant, which seems to be the only *Gymnomitrium* found in Ireland, has generally been taken for a variety of *G. concinnatum*, but is easily known by the crenulate leaves.

G. coralloides has erect, *clavate* stems, of a chalky-white colour; the leaves closely appressed, so as not easily to be detached on pressure, and either entire, or the upper ones slightly emarginate, none of the cells projecting beyond the others.

Sarcoscyphus Ehrharti, *Corda*.

J. emarginatus, *Ehrh.* Frequent near mountain rills, Killarney; Ross Bay; Maum Turk, Connemara, *D. Moore*.

There is a small, neat variety growing on wet boulders, Cromaglan, almost intermediate between this and the following species.

S. Funckii, *Nees*. Maum Turk Mount, Connemara, *D. Moore*.

Alicularia scalaris, *Corda*.

Frequent. This species may always be distinguished, even when barren, from other entire-leaved *Hepaticæ*, by the peculiar nucleate bodies, generally consisting of 2 to 4 granules, arranged in a line, contained in the leaf-cells. (Pl. X. fig. 6.)

A. compressa, *Hook.* Killarney, rare; Lough Bray! Kelly Glen, Dublin, *D. Moore*.

Plagiochila, *Nees & Mont.*

P. spinulosa, *Dicks.* (*Rab. Hep.*, n. 211.)

One of the commonest species in the south of Ireland, growing everywhere on rocks and trees. Both ♂ and ♀ plants are met with, but no perfect fruit. Like most plants propagated chiefly by rhizomatous shoots, or gemmæ, it exhibits great variety of aspect, and in the form and toothings of the leaves.

β punctata. The small variety named *Plag. punctata*, by *Dr Taylor*, is more common in the mountain ravines than the ordinary state. After a careful examination of some hundreds of specimens, I feel convinced it is not specifically distinct from *P. spinulosa*. It is said to differ "by the smaller size; the patent leaves, which are not decurrent, and are punctate cellulose; by the shorter calyx, and by the more frequent flagelliform shoots." (*Lond. Jour. Bot.*, No. 53, p. 261.) But plants exhibiting both forms of leaves are very common,—the lower wide and decurrent, the upper patent, and springing from a narrow base.

✓ *flagellifera*. This form is common in moist woods, bearing numerous fastigiate flagellæ on the upper part of the stems, with small distant leaves.

ð *microphylla*. Stems filiform, densely pulvinate; all the leaves minute. The luxuriance to which these forms attain, putting forth numerous stolons from the rhizome, and long flagellæ from the upper parts of the frond, is doubtless attributable to the moist, equable climate of these woods.

The *punctate areolæ*, which Dr Taylor thought characteristic of *P. punctata*, differ in no respect in size and form from the cells of *P. spinulosa*. But in the Irish plants the cells contain a brownish chlorophyll, and the arms of the primordial utricle can be distinctly seen. (Pl. XI. fig. 3.)

This kind of tissue, "textura porosa" of authors, looks under the microscope like distant hollow cells, surrounded by a broad, ill-defined border. On boiling the leaf for a few moments with Liq. Potas., and then adding a drop of Zinci Biniod., the true form of the cell is displayed, and its different membranes defined (fig. iii. 2). Externally is the translucent, hexangular wall, "membrana primaria," at each of the corners of which we observe a triangular clear space—"trigonum interstitiate" of authors; within that the contracted, six-angled "membrana secundaria," containing the protoplasm and coloured violet by the solution; this again includes the nucleus, generally yellow coloured—the "primordial utricle" of Mohl—which is the part generally taken for the cell. The arms of the tortoise-shaped inner membrane correspond with the "pori" in wood cells.

P. tridenticulata, *Tayl.* Pl. XI. fig. 5. Near Escalougha Lake, Cromaglan! on rocks, Torc Cascade! Brandon Mountain, *D. Moore*.

Unlike *P. punctata*, *Tayl.*, the present appears a very distinct species. The shoots are flagelliform, nearly equal throughout; stems black and rigid; leaves distant, patent, wedge-shaped, from a narrow basis, easily detached on pressure, usually *bidentate* at the apex, with an obtuse sinus (fig. v. 1).

Perigonia forming roundish spikes, of 5 to 6 acute tumid, 2 to 3 dentate leaves. Amphigastria are present in all my specimens near the apex of the stems (fig. v. 2); they are minute bifid or subulate. The leaves are more frequently bi- than tri-dentate, although an occasional lateral tooth is present, so that the name is not expressive. *Areolæ* larger than in *P. spinulosa* (fig. v. 3).

P. asplenoides, *N. & M.* Woods and banks, common.

β *minor*, *Nees*. *J. Dillenii*, *Tayl.* Ross Bay.

P. decipiens, *Hook.* (*Rab. Hep.*, No. 213.) Cromaglan, near the Police Barrack, Upper Lake; Mangerton! W. of Cork County, *A. Carroll*. *Scapania*, *Lind.*

S. compacta, *Lind.* Dingle Bay! Ben Bulbin, *D. Moore*; Ardrune Hill, and Musheragh Mount, Co. Cork, *A. Carroll*.

S. æquiloba, *Nees*. Mountain ravines,—Mangerton! Cromaglan! Ross Bay!

The ventral lobe is obtuse in the Irish plants, and the specimens seem to merge, by insensible gradations, into the next form.

S. undulata, *M. & N.*

Α *α major*. *J. resupinata*, *Eng. Bot.* Cromaglan! Lough Bray! Conner Hill; Maum Turk, *D. Moore*.

β *laxa*. There were some very curious forms belonging to this section,

one small, neat var., *elegans*, growing in damp ravines, and others, which I propose to notice on a future occasion.

B α *purpurea*, *Nees*. Coomashana Lake, Kerry! Lough Bray! and Ben Bulbin, *D. Moore*.

S. nemorosa, *Hook*. Frequent.

"Hooker's *J. nemorosa* β *purpurascens* belongs probably to *S. undulata*, A. I cannot yet find the limits of these two species, and if I believe myself for a time in order with the genus, new forms confuse me again."—Dr Gottsche, in *Lit*.

S. curta, *N. ab E*. Cromaglan, rare; *forma dentata*.

S. umbrosa. Carranlual! Glengarriff, *Miss Hutchins*.

S. irrigua, *N. ab E*.

Dr Taylor records this species from Cromaglan and Dunkerron.

The plant in Dr Greville's Herb. is a purple variety, with acute, slightly dentate leaves, and looks like some of the small forms of *S. undulata*, A.; but for the position of the lobe, which, as in *Gottschia*, is inserted a little above the base, leaving a narrow keel, *S. uliginosa*, *N. ab E*. Knockavohila, *Dr Taylor*! Lough Bray, *D. Moore*!

Jungermannia, *L. (Char. Emand.)*

J. albicans, *L*. Very common.

J. obtusifolia, *Hook*. Bantry, *Miss Hutchins*; Kinnordy, *Dr Taylor*.

J. Taylori, *Hook*. Killarney, Devil's Punch-Bowl, Mangerton, Brandon Mountain, *D. Moore*.

β . *anomala*, *Nees*.

(*J. anomala*, *Hook*.) Growing among sphagnum near Loch Guitane.

This variety has the cells of a different form from *J. Taylori*, containing curious fusiform corpuscles.

J. crenulata, *Smith*. Clay banks, Ross Bay; Kelly's Glen, Dublin, *D. Moore*; Connemara, *D. Moore*.

J. gracillima, Eng. Bot., t. 2238. *J. Gentiana*, *Hübener*.

Killarney. *J. crenulata*, β . *Hooker*, is identical with the plant of *Hübener*. Dr Hooker describes it as not differing from *J. crenulata* except in size; but all the specimens I have examined are destitute of the conspicuous border cells, and the perianth is not compressed. Smith was the first to recognise this species.

J. cordifolia, *Hook*. Coomashana Lake.

J. pumila, *With*. Glen near the Hunting Tower, Cromaglan; rare.

J. riparia, *Tayl*.

This species varies much in the form of the perianth and leaves.

Torc Cascade, Ennisconna, near Cork, *A. Carroll*.

J. obovata, *N. ab E*. Pl. XI. fig. 1.

Stems ascending, clothed with purple rootlets; leaves ovate or ovate-rotund, without margin, squarrose-patent, the base saccate; involucreal leaves connate with the perianth, the apex free; perianth as long as the involucre, clavate, quadrangular, and with four teeth; capsule sub-globose.

Kavine near the Hunting Tower, Cromaglan, growing with *Hypnum micans*. Torc Mountain.

Stems about an inch long, simple, or fasciculately branched, creeping and matted together with purple radicles. Leaves rather distant; upper ones erecto-patent; lower squamose, ovate, or roundish-ovate, obtuse; convex and serrate near the base; dorsal margin reflexed or undulate (fig. i. 4); perichæatial leaves obovate, spreading at the apex, confluent for about two-thirds of their length with the perianth (fig. i. 2); perianth obovate; the mouth

quadridentate, free; capsule roundish, spores small; perigonal leaves forming short lateral spikes (fig. i. 3), serrate, containing one or two anthers.

This species resembles closely *J. sphærocarpa* (Hook.), and *J. hyalina* (Lyell). From the former it may be distinguished by the vinous-coloured radicles, and the perianth being connate with the involucreal leaves; and from *J. hyalina*, the only allied species with purple radicles, by its round, undulate leaves, increasing in size near the apex, and with larger cells, surrounded by thicker walls; the marginal cells somewhat larger than the rest. The areolæ of *J. obovata* are very delicate (fig. i. 5). The structure of the perianth in this species resembles that of *Southbya tophacea*, Spruce, Hep. Pyr. n. 23, and forms a connecting link between *Alicularia* and *Jungermannia*.

J. nana, *N. ab E.* Glengarriff, *Miss Hutchins!* Kelly's Glen, Dublin, *D. Moore!*

Stems ascending or erect, pale green, clothed with white radicles; branches gracile; leaves round or roundish-ovate, erect, clasping; perianth obtuse, plicate, quadrangular; mouth small, four toothed, capsule globose.

Stems caespitose, from a quarter to half an inch high, innovations arising below the apex, slender, terete; cells large, pellucid; those of the margin somewhat larger.

J. sphærocarpa, *Hook.* Kelley's Glen, Dublin, *D. Moore!* Loch Bray! Temple Michael's Glen, Cork, *A. Carroll.*

J. hyalina, *Lyell.* Loch Bray, and Antrim, *D. Moore.*

J. Bantriensis, *Hook.* Rare; Glengarriff!

J. scutata, *Web.*

α *imbricata*, *Nees.* Cromaglan! Tore Mountain; Glenna! Tomie's Mount.

J. cuneifolia, *Hook.* Creeping among *Scaparia*, Cromaglan; parasitic on *Frul. Tamarisci* below Tore Mountain; Glengarriff! Bantry, *D. Moore!*

J. Wilsoniana, *N. ab E.* Killarney, on limestone; Tore Cascade, *D. Moore.* β *major*, a very large form. Carranuaol.

J. inflata, *Huds.*

α *compacta*. Howth, *D. Moore.* A curious variety, with inflated umbilicate perianths, and very short tufted stems.

γ *laxa*. Heaths, rare; near Loch Guitane; bog near Dean Bridge; Ross Bay.

J. ventricosa, *Dicks.* Rare about Killarney.

Dr Gottsche remarks of this species, that it may be always distinguished from its allies by the violet colour of the cortical layer of the stem. This character seems quite as constant as the purple colour of the rootlets of *Fossombronia pusilla*, *J. obovata*, &c.

The name *ventricosa* is only applicable to the barren perianths; the fertile ones are ovate-oblong, as shown in Eng. Bot. t. 2568, and Hooker's Jung., t. ix. lower fig., named *J. excisa*; the upper figures 11-12, with erect, secund, crisped leaves, belong to *J. intermedia*, *Ling.*

I may state here, that I quite concur with Mr Spruce (Trans. Ed. Bot. Soc., iii. p. 205), that we have no such British species as *J. excisa*. The plants I have received under that name belong to various species. *J. ventricosa minor* = *J. porphyroleuca*, *Nees*; *J. barbata*, v. *Flörckii*; *J. bicrenata*, *Ling.*, which may be recognised by its aromatic scent; and to *J. intermedia*, *Ling.*, in

which the lobes of the leaves are dentate, and the upper ones in some specimens crisped and cæspitose, when it corresponds with *J. capitata*, Hook.

J. alpestris, *Schleich.* Stems serpentine flexuose, bifidly ramose, rigid; leaves secund, semivertical, ovate-quadrate, obliquely bidentate, sinus obtuse, teeth unequal, acute, when dry connivent; involuclral leaves 2-3-fid, erect; perianth twice as long, oblong; perigonal leaves subspicate, saccate at the base.

Kinnordy, *Dr Taylor.*

The *J. gelida*, *Tayl.*, which is not unfrequent on the Scotch Alps, seems to be only a small dark-coloured variety of this species, perhaps *γ minor*, *Nees.*

J. bicrenata, *Ling.*

Kinnordy, *Dr Taylor!* Temple Michael, Cork, *J. Carroll.*

J. incisa, *Schrad.*

Rocks near Coomashana Lake, Kerry! Mayo, *D. Moore.*

J. minuta, *Crantz.*

Mangerton, growing among *Sendl. juniperina*; Wicklow Mountains. *Dr Taylor!*

J. exsecta, *Schrad.*

Rotten-logs, Cromaglan, rare! Ballinhassig and Kildowry, Cork, *A. Carroll.*

J. barbata, *Schrad.*

D. lycopodioides, *Nees.* *J. Lyoni* must, I think, be referred to the above variety; Eagle's Nest! Ross Bay, Kerry!

J. divaricata, *Eng. Bot.*

Cromaglan! Brandon Mountains, *D. Moore*; Fairhead, Co. Antrim, *D. M.*

J. catenulata, *Hübener.* (*J. reclusa*, *Tayl.*) Pl. XI. fig. ii.

Tufts shallow, extensive, olive-brown; stems rigid, terete, flexuose, catenulate; leaves scarcely broader than the stem, roundish-quadrate, upper ones erect, lower semi-vertical, secund, all concave, appressed (figs. 2, 4), divided about half way by a rather obtuse sinus, the segments acute. Fruit terminal, on short branches; perichetial 1. 2-3-fid, appressed, entire; perianth lanceolate, trigonous, apex minutely toothed; capsule elliptical, brown (fig. 2, 7).

Frequent in the south of Ireland, *Dr Taylor*; Finnahay River, near Kenmare, *R. Spruce* and *Dr Taylor!* Lachan Bay, Mayo, *D. Moore.*

This species holds an intermediate position among the bicuspidate Hepaticæ. From small forms of *J. bicuspidata*, it is distinguished by the short thick leaves, which are more secund and convex, the teeth short and incurved with a rounder sinus, by the appressed entire involuclral leaves, and the minute discrete areolæ, which are scarcely one-third the size (fig. ii. 4, 5); and the capsule (ii. 7), which, as *Dr Taylor* observes, forms an ellipse, "of which, in *J. bicuspidata*, the transverse diameter is to the conjugate as 12 to 5, while the ratio in *J. reclusa* is as 8 to 5." (*Lond. Jour. Bot.*, No. 53, p. 278.) The gemmæ are always smooth, seated on a cluster of terminal leaves (ii. fig. 3), and never on a naked capitulus.

In *J. byssacea*, the leaves are more distant, with divaricate wedge-shaped segments, and the involuclral ones dentate.

J. Francisci approaches it in the form of the leaf, but has always amphigastria on the barren as well as fertile stems.

It is more frequently confounded with the small forms of *J. connivens*; but in that species the leaves are more horizontal and plane,

with shorter teeth, and lunate sinus (ii. fig. 8), and are prolonged downwards so as to give the stem a winged appearance. Much doubt has been thrown upon the nature of *J. reclusa*, Tayl., chiefly through a want of care on the part of the discoverer, who repeatedly sent specimens of *J. bicuspidata* to Mr Wilson,* Dr Gottsche, &c., for the true plant. That the original specimen was identical with *J. catenulata* seems certain, from a small tuft in the Kew Herb., communicated by Dr Taylor, and a fragment which Mr Wilson received from Mr Spruce, who was visiting Dr Taylor at the time of the discovery.

Obs.—In all the bicuspidate Hepaticæ with prismatic calyces, amphigastria enter into the composition of the flower-bud, although they may be absent elsewhere. In *J. catenulata* we find about three rows, the lowest small and bifid, the upper larger and trifid (ii. fig. 6), and the young perianth is formed by the junction of another stipular scale, with two involucrel ones.

J. connivens, Dicks.

α conferta, minor. On rotten wood, frequent in shady woods, but usually barren. The form of the decurrent leaf, giving the stem a winged appearance, is shown (Pl. XI. f. ii. 8 a). *8 β* represents the rounded discrete areolæ, which are larger than in *J. catenulata*.

*β** sphagnorum*. Hook. Jung., t. xv. 3. Boggy places on moss.

J. bicuspidata, L.

A. α vulgaris—leaves nearly plane, subdistichous. Very common. *α* major*—Nephin Mountain, D. Moore.

β rigidula. Cromaglan.

B. "Foliis in ramis sterilibus arcte imbricatis hinc ramis his magis minusve julaceis," Nees ab E. Banks and boggy places, on sub-alpine moors—often purple.

Bβ. curvifolia (*J. curvifolia* A. Nees, in part). Hook. Jung., t. xvi. See note to the next species. The perianth in this form is frequently obovate, or more inflated than usual.

Bγ ericetorum, Nees. Under this form (*Syn. Hepat.*, p. 140), *J. reclusa*, Tayl., is quoted. I have shown above that this misconception arose from Dr Taylor's own carelessness.

J. curvifolia, Dixon. (*J. Baueri*, Hübener) *Hepaticæ Europ.*, Nos. 217 et 232.† Frequent on dead wood, Killarney.

* I give the following pithy finale of a letter from Mr Spruce to Mr Wilson, dated Feb. 22, 1844:—"Farewell to *Jung. reclusa* as a species, if Dr Taylor's authentic specimens be indeed genuine! I am sure you will agree with me that it is not only 'difficult,' but impossible, to distinguish it from *J. bicuspidata*. My examples of *J. reclusa* are such mere scraps that I feel reluctant to mutilate them; one is an original specimen from Dr Taylor, containing not a morsel of *J. bicuspidata* (nobis); the other I picked out myself from some *J. curvifolia* gathered at Cromaglan. From the examination of these I formerly thought *Jung. reclusa* might be 'something;' but if Dr Taylor's specimens sent to you be really a form of what he sent to me (which I hardly admit), then I cannot doubt it to be a mere variety of *J. bicuspidata*."

† Decas xxxiii-iv. of Rabenhorst's Hepaticæ, in which Dr Gottsche gives very good figures of the leaves, and cell-structure, of this, and other species, was not received until after this paper was in the hands of the printer. Dr G. seems to think there may be a form of *J. curvifolia* with symmetrical leaves, and shorter segments, corresponding with Hooker's figure; although he acknowledges that he has never met with an example. Individual leaves, especially on the fertile shoots, may assume this form, but on looking over a large col-

J. curvifolia is the most distinct, and least variable, of all the bicuspidate species, and yet it seems very imperfectly understood in this country. The specimens I have received under that name quite as frequently belonged to forms of *J. bicuspidata*, with convex, secund foliage, as to the true plant. This obscurity is doubtless attributable to the erroneous figures in *Eng. Bot.*, t. 1304, and also in Hooker's *Jung.*, t. xvi. (the supplementary plate is correct), both of which represent states of *J. bicuspidata*. Noting this discrepancy, Hübener came to the conclusion that the continental plant belonged to a new species, which he named *J. Baueri*. The authors of *Synop. Hepat.*, p. 142, seem to have been in doubt on this point, since they accept Hooker's plant as the typical form, and make our species their var. β *Baueri*.

It is not improbable that Dickson may have confounded the two together, but the name *curvifolia* is so expressive, that it would be a pity to alter it now.

J. curvifolia occurs in neat, compact strata, the stems gracile, of equal width throughout, and from the convexity of the leaves looking like strings of small beads (Pl. xi. iv. 1). These have a silky lustre, and are usually of a bright pink or claret colour, but sometimes pale green.

The leaves are vertical, asymmetrical, cordate, *broader than long* (fig. iv. 3), very convex, conduplicate, *gibbous posteriorly*, with the margin inflexed and tumid, bicornute, the ventral tooth not continuous with the border, but arising at some distance within it; segments long and curved, like the horns of an ox (figs. 1-3).

The axillary leaves, as pointed out by *Dr Gottsche*, are cordate-lanceolate, and have only one tooth (fig. 4); while in the perichæatial leaves there are two shorter dentate segments.

Texture thin and silky, the areolæ (fig. iv. 5) quadrate, discrete, surrounded by a pellucid border; the cell-limits indistinguishable without recourse to reagents.

Once understood, this plant is not likely to be confounded with any of the states of *J. bicuspidata*, such as the vars *B. micrantha*, and *ericetorum*, Nees. The leaves in all are ovate-quadrate, not tumid and gibbous on the ventral aspect; teeth equal, less curved, continuous with the borders of the leaf. *Texture* thicker and rigid, of a *dull green*, or purple; areolæ much *larger, oblong, hexagonal*; the walls *continuous, and well-defined*.

Mr Wilson sends from Cheshire under the name of *J. phæa*, a small purple variety of *J. bicuspidata*, which should be referred to the convex-leaved section.

J. laxifolia, Hook. Cromaglan! Mangerton! Dunkerron, *Dr Taylor*!

J. tricophylla, L. Creeping over mosses, Killarney.

J. julacea, *Lightf.* *Forma gracilis*, Hook. Brandon Mountain, *D. Moore*!

Sphagnocetis communis, *N. ab E.* (*J. Sphagni*, Dicks.)

Frequent on peat-bogs.

Chiloscyphus, *Corda*.

C. polyanthus, L. Killarney! Bangore, Co. Mayo! Kelly Glen, Dublin, *D. Moore*!

β *rivularis*, Nees. The most frequent form.

γ *palleseens*, Ldg. Mountain streams, Killarney. Fermoy; *T. Chan-*

lection of British and European specimens, I observe no variation worthy of notice, and no form that is not abundantly distinct from *J. bicuspidata*.

der! There seems to be no valid distinction between this and *C. polyanthos*.

Lophocoloa, *N. ab E.*

L. heterophylla, *Schrad.* Rare, Tore Mountain.

L. spicata, *Tayl.* On rocks below Tore Cascade, growing with *Radula voluta!* Cromaglan! Dunkerron, *Dr Taylor!* near Bantry, *Miss Hutchins!* Glensiskin near Kilworth, ♀ plant, *J. Carroll.*

L. bidentata, *L.*

β *cuspidata*, *Gottsche*, "dentibus foliorum longioribus acutissimis rectis." Frequent on dead trees in the Killarney woods.

γ *gracile*, *Carr.* (Pl. XI. fig. vi.) Fronds creeping, attenuate, not larger than in *J. bicuspidata*; leaves narrower at the base, ovate, divided half-way down into two slender, curved segments, amphigastria (f. 4.), slender, bifid. This has a different appearance from var. β, but in some tufts both forms were intermixed, and it may be an attenuated variety, like *L. divaricata*, *Tayl.*, and *L. alternifolia*, of the Antarctic Flora. *L. spicata*, which agrees with it in size, may always be recognised by its pluridentate leaves.

Var. *alata*, *Nees*. Some stems bear both entire and alate perianths; so this state is not even entitled to rank as a variety.

Obs.—*L. bidentata*, like all species having a wide range, is subject to much variation. Several of the plants described in *Synop. Hepat.*—e.g., *L. latifolia*, *N. ab E.* and *L. Hookeriana*, *N. ab E.*, not to mention extra-European forms—appear to be merely local varieties. Of *L. Hookeriana*, *Dr Gottsche* observes:—"Hooker's icon of *J. bidentata* (t. xxx. f. 7) shows a deeply divided (ad 3) involucre leaf, each lobe bidentate, which I have never seen in British or German examples, and which must be of rare occurrence, or depend on some mistake. Our German forms have the segments of the involucre leaves either entire, merely elongated cauline leaves, as in your specimens from *Esholt, Yorkshire*, or they have a small tooth on one side, and the adjacent amphigastrium is quadrifid. *Nees ab E.* finding a more deeply toothed plant growing on stones in the bed of the river Bober, in Silesia, fancied it identical with Hooker's icon, and a distinct species."

Gymnanthe, *Tayl.*

G. Wilsoni, *G.* (*Acrobolbus*, *Gottsche*.)

Discovered by Mr Wilson at the bottom of a ravine between Cromaglan and Tore Mountain, in company with *Lej. microscopica*, and *Hypnum flagellare* in fruit. I was not fortunate enough to meet with this interesting plant, although I searched many times what I suppose was the original station, a ravine opposite the Hunting Tower, Cromaglan, where many are species abound. *G. Wilsoni* is the only European representative of this southern type.

Saccogyna viticulosa, *Dumort.*

Very common in the south of Ireland! Lough Bray, Co. Wicklow, *D. Moore!*

II. Leaves Incubous. *Sinistrorsal*.

Calypogeia, *Raddi*.

C. Trichomanis, *Corda*. Common.

β *repanda* (*C. fissa*, *Raddi*, *Eng. Bot.*, t. 1875). Moist banks growing with *J. setacea*, *J. connivens*, &c. In some tufts part of the

leaves were entire, others bifid, showing a transition between the two varieties.

Lepidozia, *Syn. Hep.*

L. setacea, *Mitt.* (*Jung. setacea*, *Web.*) Frequent on shady banks.

β. sertularioides. Among *Sphagnum*, &c.

I agree with *Mr Mitten* that this species is more naturally associated with the "capillares" group of *Lepidozia* than with *Jungermannia*; but how he traces the alliance of *Jung. tricophylla* with *Ptilidium*, is not so easy to understand.

L. reptans, *L.* (Pl. XI. fig. viii.)

Less frequent than the following species.

L. cupressina, *Ldg.* (Pl. XI. fig. vii.) *Rabenh. Hep. Eur.*, No. 214.

β. tumidula. (*L. tumidula*, *Tayl.*) *Jung. reptans*, *β. pinnata*, *Hook.*

This fine species attains great luxuriance in the south of Ireland, forming dense, cream-coloured cushions, on ledges of rock, and trees.

L. tumidula is said to differ in the bipinnate, less attenuated ramuli, and broader leaves. The Irish specimens vary much both as to size, ramification, and shape of the leaves. Some stems are distantly and irregularly branched, and scarcely distinguishable from *L. reptans*, while others are densely pinnate, bi- or even tri-pinnate, according to the age and luxuriance of the plant,—new stems springing from the old in a proliferous manner.

Having compared it very carefully with examples of *L. cupressina* from various parts of Central America, and the West Indies, I have been unable to meet with any reliable diagnostic character; indeed these specimens differ more among each other than from our plant.

The perianths also, which I was fortunate enough to meet with, correspond with fertile tufts from Jamaica. The involucreal leaves are variable in shape, obtusely tridentate, the central tooth reflexed, with larger, rhomboid areolæ than on the stem leaves (vii. fig. 3, 4).

From *L. reptans* it is distinguished by the dense erect habit, closely pinnate ramuli, subvertical cordate leaves, which like the amphigastria are quadrifid (fig. 1), the ventral teeth inflexed, areolæ smaller, hexagonal (fig. 2); whereas, in *L. reptans* the ramification is more lax, leaves less imbricated, nearly horizontal, ovate-quadrate, and tridentate (viii. fig. 1); and the cells are very conspicuous, roundish, with thick walls (fig. 2).

Mastigobryum, *Syn. Hepat.*

M. trilobatum (*Nees*), *L.*

Mountain woods, not very common.

M. deflexum, *α. tricrenatum*, *N. ab E.*

Frequent about *Torc*, *Cromaglan*, &c.; *Glengarriff*! *Glenbower Wood*, *Fermoy*, *A. Carroll*! *Brandon Mountain*, *D. Moore*.

Physotium cochleariforme (*Hook.*), *Nees*.

Mountain heaths, near *Loch Guitane*! *Glena*! *Escalougha*! Frequent about *Dingle Bay*! *Brandon Mountain* (*A. Carroll*)! *Connemara*, *D. Moore*!

Trichocolea tomentella, *Dumort.*

Common about *Killarney*. *Lough Bray*, *D. Moore*!

Ptilidium ciliare, *N. ab E.* Rare. *Mangerton*! *Ross Bay*!

Sendtnera Woodsii, *Endl.* Rocks near the *Devil's Punch Bowl*, *Mangerton*! *Conner Hill*, *Dingle Bay*, *D. Moore*! *Brandon Mountain*, *Dr Taylor*!

S. adunca (Dicks.) Gott. *Jung. juniperina*, β . Hook.

β . *Hutchinsia*, G. "Foliis longioribus in sicca planta aduncis, in humecta squarrosis, segmentis incurvis lanceolatis, basi imo haud denticulatis," Rabenh. *Hepat. Eur.*, No. 210!

Frequent in the south of Ireland, and found at much lower altitudes than in Scotland.

S. juniperina is widely distributed throughout the mountain districts of the Northern Hemisphere, and, like other cosmopolitan species, —e. g., *Dicranum scoparium*—assumes many aspects, having the leaves "magis orthophyllis vel falcatis."

In the original *J. juniperina*, Swartz, the leaves are fringed with 5 to 10 cilia at the base, and the cells of a different form, which may account for the peculiarity described by Sir W. Hooker, "which is, that, on immersing a dry specimen in water, the absorbent vessels are immediately put in action, and the remarkable divarication of the segments of the leaves, noticed by Dr Swartz, appears almost at the same moment." Our British plant, on the contrary, "recovers extremely slowly in water."

The leaves of the Irish form are longer and more falcate, and of a paler fulvous colour than is usual in the Scotch specimens (*S. straminea*, Dumort.), in which the leaves are ovate or ovate-lanceolate, segments erect, lanceolate, and the colour darker brown, or almost black. That again approaches the *S. Sauteriana*, Nees, with the leaves still broader, and the segments ovate. It must be confessed, however, that in Scotch varieties are found having leaves quite as falcate as in the Irish plant; and it is only on the higher and exposed mountains that the leaves become abbreviated, while in moister and more sheltered localities they attain greater luxuriance.

Among the extensive series of Himalayan *Hepaticæ*, collected by Dr J. D. Hooker, I observed several curious and distinct looking forms, which I think deserved more attention than Mr Mitten has bestowed upon them in his enumeration of Indian *Hepaticæ*. He refers all the specimens to *S. juniperina*, γ . *ramosa*, Nees, and does not admit the *S. dicrana*, Tayl., as distinct. Probably it would be more correct to consider *S. dicrana*, and the other forms, as peculiar *races*, rather than species; at any rate, they present appreciable characters, which deserve recognition. I find the following remarks in a letter from Dr Gottsche, bearing upon this question:—"I quite agree with your remarks about the limits of species. I find every species to be in reality a *group*. Hence it follows there must be varieties, and these must be distinguished. Take, for instance, *S. juniperina*, to which Mitten reduces again *S. dicrana*: it may be easy enough for an expert to know that both belong to the same specific type, but the general result will be (as in Mitten's paper), that the so-called varieties are neglected, or ignored altogether."

The cellular tissue of *J. juniperina*, prepared with Zincum biniodatum, as above directed, affords a very interesting microscopic study. The cells at the base of the leaf, and along the centre of the segments, are linear, and differently shaped from the rest, forming a kind of nerve. The clear outer wall is crenate at the margin, and the surface raised into delicate striæ; within this we observe the contracted, violet-tinted inner membrane, which, as in *Taxus baccata*, is ribbon-shaped, and encloses a spiral band of 10–20 annulations, some of which are distinct, others confluent.

The spiral fibre of *Sphagnum* differs in being deposited within the *membrana primaria*, not, as in this case, within the *membrana secundaria*. These elongated spiral cells will enable us to understand how the vascular tissue of the higher plants is developed. The cells of *S. Woodsii* are equally interesting, with their deeply-lobed hyaline walls, and multi-brachiate nucleus.

Radula, *N. ab E.*

R. complanata, *Dumort.*

Common on trees. *Monoicous*! The ♂ spike, which consists of 3-5 perigonal leaves, may be always found seated beneath the fertile bud, or perianth. Hence, some of the barren plants quoted in *Syn. Hep.*, p. 257, from the Cape of Good Hope, &c., must belong to another species—perhaps *R. obscura*, Mitt.

R. aquilegia, *Tayl.* *Rab. Hepat. Eur.*, No. 207!

On exposed rocks, Cromaglan, ♀! Abundant near Coomashana Lake, Dingle Bay, ♂ plant.

β. *major*, on shady rocks and trees, Killarney woods.

Dioicous, so that it cannot be a variety of *R. complanata*, as Hooker described it; known also by the smaller size, tumid involute lobes, and olivaceous colour.

The var. β is more difficult to define, having the habit of *R. complanata*, but with more distant ramuli, ♀ florets terminal on short lateral branches; archegonia sterile, brown, patulous; inflorescence dioicous, colour a dull green, like *Phragmicoma Mackaii*.

Dr Hooker may be correct in referring this species to *R. physoloba*, Mont., with which also *R. flavifolia*, *Tayl.*, must be united.

R. voluta, *Tayl.*

On boulders by the stream below Tore Waterfall, growing with *Lophocolea spicata*. This species is also *dioicous*; the lobe of the leaf is remarkably broad and undulate, crossing the stem.

The male spikes consist of 3-4 pairs of perigonal leaves, each enclosing two anthers; they are at first seated near the apex of small lateral shoots, but by the growth of the terminal bud, appear at length basal.

"I have found barren perichætia 'vel frustanea,' on the sides of the stems, so that the fructification must approach that of *R. Xalapensis*, Mont."—*Dr Gottsche in lit.*

Madotheca lævigata, *Dumort.*

Very fine on rocks by the Upper Lake, and Dean Bridge! Lough Bray! common near Cork, *A. Carroll*.

M. rivularis, *Nees*.

Stream near Fermoy, *T. Chandler*.

M. platyphylla, *Dumort.*

Not unfrequent on limestone.

M. porella, *N. ab E.*

Monkstown near Cork, *A. Carroll*? I have not seen specimens, but Dr Taylor sent it to Dr Gottsche from the south of Ireland.

Phragmicoma Mackaii, *Dumort.* *Rab. Hepat.*, No. 206!

Very common on the Scar-limestone, Mucross demesne; and rocky borders of the lakes.

Lejeunia, *G. & Ldg.*

L. calcarea, *Libert.* (*L. echinata*, *Tayl.*)

Limestone cliffs, Mucross demesne, growing on *Thamnium alopecurum*.

L. hamatifolia, *Hook.* *Rab. Hepat.*, No. 215!

One of the commonest species on trees and rocks ; the fruit, however, is of rare occurrence.

L. microscopica, *Tayl.*

Growing with *Loph. bidentata*, near Torc Cascade ! on dead stumps, Glenna ! ravine opposite the Hunting Tower, Cromaglan ! with *Gymnanthe Wilsoni*, G. Cromaglan (1849), *W. Wilson*.

Within the axillæ of the leaves of this, and other species of *Lejeunia*, pearl-like globules are often met with, which may be mistaken for *antheridia*. They consist, however, of the contracted bodies of Rotifers (*Philodina rosea*), and on adding a drop of *Liq. potassæ* the walls dissolve, leaving only the horny mastax.

L. minutissima, *Sm.* Eng. Bot. t. 1806.

α. amphigastriata = *L. ulicina*, *Tayl. et Syn. Hepat.*, p. 387.

On trees and hepaticæ, Killarney ! about Cork, frequent, *I. Carroll*.

α. 2 major, stems longer, sparingly branched, creeping among damp mosses ; leaves tumid, distant, the lobes nearly equal, obtuse. Wet places among mosses, Torc Cascade ! Glenna, and Eagle's Nest ! This may be a distinct species, but only barren specimens were observed, and the altered appearance may be due to the moister habitat.

β. sine amphigastriis. Rab. *Hepat. Eur.*, No. 216. (*Lej. Taylori Spruce*, Trans. Ed. Bot. Soc., vol. iii. p. 212.) *L. minutissima*, *Tayl. et Syn. Hepat.*

Less frequent than the stipulate form. Ash trees, Mucross ; near Cork, *I. Carroll*.

L. ovata, *Tayl.*

Damp rocks, Torc Cascade ! Cromaglan ! Glenna ! abundant near Coomashana Lake, Ross Bay !

L. serpyllifolia, *Dicks.*

Very frequent on shady rocks and trees.

β. thymifolia ; leaves larger, elliptic-ovate, very convex, closely imbricated, inflexed. Forming handsome, densely pulvinate tufts, of a pale yellow colour, not turning black when dry ; texture firmer, and less hyaline.

γ. heterophylla ; branches attenuate, microphyllous ; lobule obsolete ; leaves plane, variously shaped, distant ; chlorophyllose.

On wet shady rocks, O'Sullivan's Cascade ! near Torc Cascade.

L. calyptrifolia, *Hook.*

On the rough bark of pines, Torc Mountain ; rare.

Frullania, Raddi.

F. Hutchinsiae (*Hook.*), *Nees.* Rab. *Hepat. Eur.*, No. 208 !

On dripping rocks, Torc Waterfall ! Minister's Fall, and O'Sullivan's Cascade ! Caves, Dingle Bay, *D. Moore* ! Ballinhassig Glen, Cork ; and near Kinsale, *I. Carroll*.

β. compacta ; stems gracile, closely imbricated ; leaves smaller, more convex.

In drier places ; ravine below Eagle's Nest ! Cromaglan !

F. dilatata, *L.*

Everywhere on trees and rocks.

F. fragilifolia, *Tayl.*

Shady rocks on the borders of the lakes, frequent ! on trees, Mucross demesne, and near Dean Bridge ! Dunkerron, Dr Taylor. On boulders, Bantry Bay ! Glengariff.

F. Tamarisci, *Nees. ab E.*

A. *Leaves crossed by a moniliform line of cells.*

Perhaps the commonest species in the south of Ireland.

β. *microphylla*, Gott. Rab. Hep. Eur., No. 209!

On the smooth bark of beech trees, Old Weir Bridge, with abundant fruit. Not larger than *F. fragilifolia*, for which it was at first mistaken; but the stems are more regularly pinnate; leaves from a broader base, more *convex*, and *polished*; areolæ larger, two or three rows of cells in the lower half double the size of the rest; involucrel leaves acute, repand, nearly entire, the lobe lanceolate as in *F. Tamarisci*; whereas, the leaves of *F. fragilifolia* are *dull purple*, from a narrower insertion, readily detached on pressure; areolæ smaller, with darker walls, one row of larger and more intensely coloured cells crossing the leaf obliquely; involucrel leaves obtusate, serrate-dentate.

γ. *atrovirens*; stems elongated; leaves elliptic-ovate, apiculate, inflexed, of an indigo-green colour, forming wide shallow patches on rocks subject to inundation. Eagle's Nest! Cromaglan!

B. *Moniliform cells wanting.*

δ. *germana*. *F. germana*, Tayl.

Leaves wanting lustre, very convex, the lobules evolute; involucrel leaves entire.

On trees, Killarney! frequent in the south of Ireland, *Dr Taylor*.

Obs.—*F. Tamarisci* is a more variable plant in Ireland than I have observed it elsewhere. The moniliform line of cells is usually present; but in some specimens we observe it in some leaves and not in others, and in *F. germana* it is wanting. Nor can the form of the lobule be depended upon, as on the same branch some of the lobules may be evolute, others helmet-shaped.

Note to Ephebe byssoides, page 411.

It is curious that, at a meeting of the *Dublin Zoological and Botanical Association*, May 1862, *Mr D. Moore* described independently a plant which may be identical with *Ephebe byssoides*, Nobis. This was first collected at Cromaglan, April 1858, but without fruit. It is thus defined: "Thallus coriaceo-gelatinous, filamentose fruticulose, terete compressed, *rugose*, dichotomously branched; apices obtuse; *gonidian granules scarcely coherent*; colour dark olive brown. Apothecia?" This description differs from that given above, in the rugosity of the thallus and non-coherence of the gonidia; whereas, the thallus of *E. byssoides* was smooth and polished, and the gonidia arranged in distinct rows. It may refer to a species which is much more common about Killarney, with a darker, rough, brittle thallus, and scattered gonidia, which resemble the tetraspores of some algæ (Pl. X. fig. 3), and which I have referred to the *Ephebe pubescens*, Fries.

I have not seen specimens of Mr Moore's plant, which Dr Hepp names *Leptogium Moorii*; but if it proves the same as our fertile one, I still think it should be referred to *Ephebe* rather than *Leptogium*.

Without discussing the question of priority of nomenclature, it will afford me pleasure to substitute the name of *Ephebe Moorii* for that given above.

DESCRIPTION OF PLATE X., Figs. v. vi.

Fig. v. *Gymnomitrium crenulatum*, Gottsche.

1. Natural size. 2. Branch (×20). 3. Fertile ramulus (×40). 4. Apex of barren ramulus (×60). 5. Stem leaves. 6. Involucrel leaf, enclosing the calyptra

and capsule. 7. Archegonia surrounded by the inner involucreal scale. 8. Part of the apex of a leaf, showing the crenate margin and form of the cells ($\times 300$). 9. Anther. 10. Spores and bi-spiral filaments; these are badly figured.

Fig. vi. *Alicularia scalaris*.

Areolæ of the leaf ($\times 300$) as seen in the living plant; the cells containing chlorophyll granules, and peculiar jointed nuclei. From a drawing of Dr Gottsche.

PLATE XI., Figs. i.-viii.

Fig. i. *Jung. obovata*, Nees.

1. Plant not magnified. 2. Upper part of fertile stem, showing the adnate perianth and capsule. 3. Stem with ♂ spikelet. 4. Stem leaves. 5. Areolæ.

Fig. ii. *J. catenulata*, Hüben.

1. Stems natural size. 2. Fertile stem and perichætium. 3. Apex of gemmiferous stem. 4. Leaf treated with Liq. potassæ. 5. One of the segments showing the punctate areolæ ($\times 300$). 6. Perichætial leaf, the segments entire, and amphigastrium. 7. Calyptra and capsule. 8a. Decurrent leaf of *J. connivens*, giving the stem a winged appearance. 8b. Large convex areolæ ($\times 300$).

Fig. iii. *Plag. punctata*, Tayl.

1. Stem leaf. 2. Cells prepared with zinc. biniod. ($\times 300$).

Fig. iv. *J. curvifolia*, Dicks.

1. Stem leaves, ventral aspect. 2-4. Leaves ($\times 120$). 6. Apex of leaf and areolæ.

Fig. v. *Plag. tridenticulata*, Tayl.

1. Upper portion of ♂ stem ($\times 20$). 2. Amphigastria. 3. Leaf cells ($\times 300$).

Fig. vi. *Loph. bidentatum*, v. *gracile*.

1. Stem ($\times 20$). 2. One of the leaves ($\times 120$). 3. Areolæ ($\times 300$). 4. Amphigastrium.

Fig. vii. *Lepidoz. tumidula*, Tayl.

1. Stem leaves and amphigastria ($\times 20$). 2. Areolæ ($\times 300$). 3. Perianth and involucre. 4. Involucreal leaves.

Fig. viii. *Lep. reptans*.

1. Stem leaf and amphigastrium ($\times 20$). 2. Areolæ ($\times 300$).

II. On some *British Cyperaceæ* recently discussed by Dr Carrington. By CHARLES C. BABINGTON, M.A., Professor of Botany, Cambridge.

It is only within the last few weeks that I have become acquainted with the "Notes upon the Cyperaceæ," by Dr Carrington, contained in the "Transactions of the Botanical Society" (vol. vii. pp. 259 and 320). Having read them with much interest, I may be allowed, and indeed perhaps I am called upon, to make a few remarks upon the species there noticed. They are chiefly in confirmation of Dr Carrington's statements.

(1.) *Carex Grahmi*, Boott.—It is quite possible that this may be a monstrous form of *C. pulla*, Good., but I am much more inclined to agree with Dr Boott in believing it to be distinct. I possess a considerable quantity of the ripe utricles of *C. Grahmi*, derived from plants cultivated in the late Mr Borrer's garden. In such of them as I have opened I find what seem to be ripe nuts. These are pale yellow, not half as long as the utricle, about $\frac{1}{15}$ of an inch long, oblong, compressed,



