

TASMANIAN HEPATICÆ.

By R. A. BASTOW, F.L.S.

IN popularly written botanical handbooks the *Hepaticæ* are usually not described, the authors chiefly confining their attention to plants of larger growth. The phanerogamous plants receive full notice; the *Ferns* and *Lycopods* may also be described; but here the line is usually drawn. The *Mosses*, *Hepaticæ*, *Lichens*, and *Fungi* are dismissed with some such remark as that they are distributed throughout the world, and are of no economical importance; or that they form beautiful transition from low to high organisation, and that they are evascular.

Few persons ever dreamed that earthworms were of any importance until Darwin observed and described their habits; and, probably, quite as few are aware of the aid lent by the *Mosses* and *Hepaticæ* to the economy of nature in the formation of peat; it is not at all unlikely that the *Hepaticæ* cushioned the swampy ground ages ago, and contributed their share in the structure of coal for the use of man at the present day. It may, therefore, not be wasted time if we bestow a little attention to the Natural Orders of Australasian Cryptogams, containing, as they do, the more minute forms of plant life.

I essayed during the last session of this Society to describe, to the best of my ability, the Tasmanian *Mosses*, and now venture upon a description of the *Hepaticæ*. Doubtless, many errors may be found that a more experienced and abler pen would have avoided; but as the reference to descriptions is a first necessity in the study of *Hepaticæ*, even if that reference be but a poor one, and as the subject has not yet been taken in hand since the publication of Hooker's "Flora Tasmaniae,"—with the exception of the valuable supplement in Vol. XI. of Baron von Mueller's "Fragmenta Phytographiæ Australiae,"—and as those who reside far away from the city and are desirous to know something about the *Hepaticæ* that grow in such profusion in the moist gullies and by the banks of streams, but have no hand-book on the subject that they can consult, I may venture to hope that the following compilation may to some extent be useful, its many shortcomings notwithstanding.

The entire structure of some of the *Hepaticæ* so resemble the *Mosses* (Pl. ii. f. 2) as to render them popularly regarded

as identical: but they may be distinguished therefrom by their soft, spongy, lax texture, by their leaves being destitute of nerves, by their frequently less vivid colours, and by their affecting moister situations. They vary in size, as do the *Mosses*, from six inches long or more, and remarkable for their beauty as well as their size, to very minute capillary forms, scarcely distinguishable as plants without the aid of the microscope. The fruiting specimens are not so easily detected as they are in moss plants, but that apparent deficiency is more than counterbalanced by the numerous and exquisite forms of leaves (Pl. iii.), which afford excellent characteristic points for the determination of genera and species.

It is probable that the *Hepaticæ* grow in greater profusion and variety, and attain greater size and beauty, in the densely ferned and matted dingles on the moist slopes of the mountains of Tasmania than in any other part of the world. A little rough scrambling through the tangled masses of vegetation, and a little climbing over fallen forest giants, yet keeping near to the stream, and we are certain soon to discover the old decaying logs completely covered with *Hepaticæ*,—so much so as to effectually conceal the decaying wood that supports them.

Some of the cavities in the logs are matted with an abundance of long, stringy, whitish plants, these are soft and yielding *Lepidozia* (Pl. xxii.-v.), and charming objects for the stage of the microscope, the leaves being scarcely visible to the naked eye. Other logs will be found covered with the giant amongst *Hepaticæ*—*Gottschea Lehmanniana*. It is of light green colour, and is suspended in masses over the stream. The large size of this plant—six inches or more—makes it a prominent object, yet its leaves are so curiously laminated and folded that it is very difficult to dissect for the purpose of absolute certainty in determination of species. Some of the rocks are covered with a dark green moss-like coating, rough velvety both in appearance and touch—the genus *Lejeunia* (Pl. xxvii.); although the leaves are minute, each leaf is furnished with a sac, the water in the sac swarming with moving bodies. Others are covered with a light brown and beautifully pinnate plant—*Polyotus magellanicus* (Pl. xxix.), each leaf bearing a club-shaped lobule, so curious an appendage that when once observed it will not be readily forgotten.

All the foregoing belong to that section of *Hepaticæ* known as *FOLIOSÆ* (Pl. ii., f. 1, 2, 3). They are plants with distinct stems, bearing distinct leaves.

But there are other *Hepaticæ* that have no distinct stems or leaves, these organs being fused into one flat leaf-like frond, hence the name of the section *FRONDOSÆ* (Pl. ii., f. 4, 5). To

this section belong the *Blyttia*, *Metzgeria*, and other genera. The latter may be observed forming a perfectly flat network around the bark of living trees. It is almost impossible to secure a perfect specimen without taking the bark as well; but the collector will be amply repaid when he settles down to its examination with the microscope. The under side of the frond is particularly interesting.

The third section of the Order is called *CARNOSÆ* (Pl. ii., f. 6-8). In this the fronds are broad and fleshy, of a vivid green colour, having oblique scales on their under sides. They cover moist rocks or stumps, and sometimes grow on earth. By the aid of a pocket lens small receptacles will be observed on the upper surfaces surrounded by a beautiful pellucid fringe; the receptacles contain small reproductive bodies called *gemmæ*. Seen for the first time they are sure to remind the observer of a miniature bird's nest with eggs in.

The remaining section is *ANTHOCEROTÆ* (Pl. ii., f. 7); these also have fleshy fronds, but differ from the preceding section in being without scales on the under sides, and in the manner of fruiting.

The plants of this Natural Order are nearly always procumbent, the *dorsal* side of the stem being the upper side *as it grows* (Pl. iii., f. 4), and the under side the *ventral* (Pl. iii., f. 4).

For the purposes of identification, botanists have divided the *Foliaceous Hepaticæ* according to the manner in which the leaves are set on the stem; they are either *succubous*, *vertical*, or *incubous*, and it is not easy for beginners in the study to determine in which manner the leaves are actually set; it is, therefore, important to make the differences very clear. If the lowest part of the base of the leaf is on the *dorsal* side of the stem the leaf is *succubous* (Pl. iii., f. 1, 2). If the base of the leaf crosses the stem transversely, it is *vertical* (Pl. iii., f. 3). If the lowest part of base of the leaf is on the *ventral* side of the stem, it is then *incubous* (Pl. iii., f. 4.)

The *stipules* are the third rank of leaves, and are, generally, comparatively small; they are, however, of great use in identifying the genus and species of the plant.

The fruit, as in mosses, is generally *terminal* or *lateral*. If terminal, the *pedicel* of the *capsule* will proceed from the apex of the stem; if *lateral*, the pedicel will proceed from the side of the stem. In some of the genera the fruit is embedded in the frond. Usually, the fruit of *Hepaticæ* may be known by the pellucid cellular fruitstalk, with four brown radiating arms at the tip of the stalk; it generally consists of an *involucre*, a *perianth*, a *calyptra*, and a *capsule*. The *involucre* is a few elongated and, sometimes, lobed leaves, and, in most cases, the *perianth* may be observed within these. The *perianth* is an

erect, tubular, or inflated sheath. It is sometimes *compressed*, and is frequently *angled* or *keeled*. The *mouth* of the *perianth* may be *contracted*, *dilated*, *entire*, or *lobed*, these distinctions being, in many cases, specific characters. Within the *perianth* the transparent oblong or globose *calyptra* will be seen if the fruiting is sufficiently advanced, and here, at the base of the fruitstalk, it remains, not ascending with the *capsule* as in mosses; of all the fruiting organs in *Hepaticæ* this alone is never absent. As the *capsule* ripens it bursts the *calyptra*, and is carried through it and upwards as a small blackish ball at the tip of the pellucid stem, and, when ripe, it bursts, in most species, into four valves (Pl. v.); the *capsule* then appears as a small brown cross. The *capsule* contains innumerable *spores*, mixed up with long spiral threads called *elaters*; when the *capsule* bursts these *elaters* twist about and throw the *spores* to some distance. *Elaters* are never found in the fruit of mosses.

The *female inflorescence* or *archegonia* consist of minute and slender flagon-shaped bodies with long tubular necks; within each there is one solitary loose cell. One of these becoming fertilised, it eventually ripens into the *calyptra* above described, the loose cell becoming the *capsule* (Pl. xi., f. 1, 2.)

The *male inflorescence* or *antheridia* are very minute pedicelled sacs on the same or on different plants from those containing the *archegonia*. They are usually solitary on the axils of modified (*perigonial*) leaves, which sometimes occupy proper branchlets (Pl. xi., f. 3, 4). The fruit of the FRONDose *Hepaticæ* is somewhat different. In the *Marchantia*, for instance, the *involucre*, *perianth*, and *capsule* are contained on the surface of a green or brownish-stalked receptacle (Pl. ii., f. 6). These will be familiar to most persons as small green-stalked knobs, growing from leafy expansions on wet rocks or stumps. The *gemmae* contained in the fringed receptacles found on these frondose expansions, and before alluded to, are themselves reproductive.

BIBLIOGRAPHY.

The illustrations, descriptions, and references are, for the most part, taken from the following works :—“*Flora Tasmaniae*,” “*Flora Novæ-Zelandiæ*,” “*Flora Antarctica*,” and “*Handbook of the New Zealand Flora*,” by Dr. J. D. Hooker, F.R.S.; “*Musci Exotici*,” by William Jackson Hooker, F.R.A. and L.S.; “*Fragmenta Phytographiæ Australiæ*,” by Baron von Mueller, M.D., Ph. D., &c.; “*Hooker’s Botanical Miscellany*,” “*London Journal of Botany*,” “*Species Hepaticarum*,” by J. B. G. Lindenberg; “*Icones Plantarum Asiaticarum*,” by Griffiths; “*Hoffmeister’s Higher Cryptegams*,” MSS. from H. Boswell, Esq., M.A., Oxford; MSS. and Drawings from Dr. Carrington, M.D., F.R.S.G., and W. H. Pearson, Esq., Eccles, England; Mr. Archer’s Herbarium, Roy. Soc., Hobart, arranged by Mr. Mitten; and the *Hepaticæ* in the author’s Herbarium.

DETERMINATION OF GENUS.

In order to determine the genus to which one of the *Hepaticæ* belongs, the accompanying Key to Genera will be found useful.

1st. Determine if the plant possesses distinct leaves ; if it does, its genus must be looked for in the section FOLIOSÆ, headed A.

If the plant has not leaves, but is simply a long or short thin frond, it belongs to section FRONDOSÆ, under B.

If the frond is fleshy, with scales on its under side, it will be amongst the CARNOSÆ, under C.

If the frond is fleshy, but without scales beneath, it then comes under the section ANTHOCEROTÆ at D.

2nd. Assuming that the plant to be identified is *foliaceous*, the manner in which the base of the leaf is set on the stem must be accurately determined. It may be *succubous*, or *vertical*, or *incubous* ; but it will come under one of these three headings. If *succubous*, its genus will be found in the first fifteen genera ; if *vertical*, its place will be in one of the genera from sixteen to nineteen inclusive ; if *incubous*, its genus must be looked for in the genera numbered twenty to twenty-nine inclusive.

3rd. Note the *perianth* ; it may be leafy, or it may be a fleshy bag, or the plant may not have a *perianth*.

Assuming that the leaves are *succubous*, and that the *perianth* is *leafy*, the plant will belong to one of the first ten genera.

4th. Ascertain whether the fruit is *terminal* or *lateral*.

Assuming that the fruit is *lateral*, the plant will belong to one of the genera numbered eight, nine, or ten. Reading the short descriptions of these three genera in the key, we find that one genus is without *stipules*, another possesses *stipules*, and the remaining one has its leaves deeply cleft. These are sufficient differences for determination of genus.

KEY TO GENERA.

The arrangement of the *Hepaticæ* of New Zealand by Mr. Mitten, in Hooker's Handbook of the Flora of that Colony, is very useful in aiding the student to determine the genera, and the following *Key* is an illustrated adaptation of that arrangement to the *Hepaticæ* of Tasmania.

A.—FOLIOSÆ.—Leaves distinct. (Pl. ii., f. 1, 2, 3.)

* Leaves succubous; base with the lowest angle on the upper side of the stem. (Pl. iii., f. 1, 2.)

(a.) PERIANTH, LEAFY. (Pls. iv.—xv.)

1. *Fruit terminal.*

1. PLAGIOCHILA.

Perianth compressed; stems erect or ascending; no stipules. (Pl. iv., v.)

2. LEIOSCYPHUS.

Perianth compressed; stems procumbent, stipulate. (Pl. vi.)

3. TEMNOMA.

Perianth above trigonous, truncate. (Pl. vi.)

4. LOPHOCOLEA.

Perianth triquetrous; angles often alate; mouth three-lipped, closed; stems procumbent, stipulate. (Pl. vii., viii., ix.)

5. TRIGONANTHUS.

Perianth trigonous; mouth contracted; stems procumbent, stipulate near the fruit. (Pl. ix.)

6. JUNGERMANNIA.

Perianth tubular ; mouth contracted, dentate , stipules none, or present on the stem. (Pl. x.-xii.)

7. SOLENOSTOMA.

Perianth obovate, 5-plicate above, with a tubular beak. (Pl. xi.)

2. *Fruit lateral.*

8. ADELANTHUS.

Stems erect, nodding ; no stipules. (Pl. xii.)

9. CHILOSCYPHUS.

Stems procumbent, stipulate. (Pl. xiii., xiv., xv.)

10. PSILOCLADA.

Stems procumbent ; leaves and stipules deeply cleft. (Pl. xv.)

(b.) PERIANTH A DESCENDING FLESHY BAG. (Pl. xvi., xvii.)

1. *Fruit terminal.*

11. TYLIMANTHUS.

Stems erect or ascending ; leaves nearly entire ; no stipules. (Pl. xvi.)

12. ACROBOLBUS.

Stems procumbent ; leaves, 2-fid ; stipules small or none. (Pl. xvi.)

13. LETHOCOLEA.

Stems procumbent ; leaves entire ; no stipules. (Pl. xvi., xvii.)

14. BALANTIOPSIS.

Stems procumbent, stipulate. (Pl. xvii.)

2. *Fruit lateral.*

15. MARSUPIDIUM.

Stems erect or ascending ; no stipules.

** Leaves vertical ; base crossing the stem transversely. (Pl. iii., 3.

(a.) PERIANTH NONE. (Pl. xviii.)

1. *Fruit terminal.*

16. GYMNOMITRIUM. (Pl. xviii.)

(b.) PERIANTH LEAFY. (Pl. xviii.)

1. *Fruit terminal.*

17. ISOTACHIS.

Leaves and stipules nearly equal; perianth tubular; mouth connivent. (Pl. xviii.)

18. SCAPANIA.

Leaves complicate; no stipules; perianth compressed in plane with leaves; mouth truncate. (Pl. xix.)

19. GOTTSCHAEA.

Leaves with adherent lobe; perianth overlaid by involucre leaves. (Pl. xx.)

***Leaves incubous; base with the lowest angle on the under side of the stem. (Pl. iii., f. 4).

† Without an inferior lesser lobe.

(a.) PERIANTH LEAFY.

1. *Fruit terminal.*

20. SENDTNERA. (Pl. xxi.)

2. *Fruit lateral.*

21. LEPEROMA.

Leaves and stipules deeply cleft; calyptra adnate with the involucre leaves; fruit near the top of stem. (Pl. xxi.)

22. LEPIDOZIA.

Leaves and stipules usually deeply cleft; perianth near the base of the stem, trigonous. (Pls. xxii., xxiii., xxiv., xxv.)

23. MASTIGOBRYUM.

Leaves and stipules entire, or with their apices truncate, dentate; perianth in the lower part of the stem, trigonous. (Pl. xxvi.)

†† With an inferior lesser lobe.

(a.) LOBULE PLANE.

1. *Fruit terminal.*

24. RADULA.

Perianth compressed in plane with leaves; mouth truncate; no stipules. (Pl. xxvi.)

25. LEJEUNIA.

Perianth obovate, 3-6-plicate; mouth a tubular beak.
(Pl. xxvii.)

26. TRICHOCOLEA.

Calyptra and involucrel leaves combined; leaves capillary, multifid. (Pl. xxviii.)

2. *Fruit lateral.*

27. MASTIGOPHORA.

Perianth ventricose, subcampanulate. (Pl. xxi.)

(b.) LOBULE INFLATED-GALEATE.

28. FRULLANIA.

Perianth 3-6-plicate or terete, with a tubular beak.
(Pls. xxviii., xxix.)

29. POLYOTUS.

Involucrel leaves overlying each other, adnate below.
(Pl. xxix.)

B.—FRONDOSÆ.—Without distinct Leaves.

(Pl. ii., f. 4, 5.)

(a.) PERIANTH COMPLETE.

30. FOSSOMBRONIA.

Perianth on upper side of frond; leaves angular.
(Pl. xxx.)

31. ZOOPSIS.

Perianth lateral; frond continuous, with alternate lateral projections, tipped with cilia. (Pl. xxx.)

32. PODOMITRIUM.

Perianth from the under side of a continuous frond.
(Pl. xxxi.)

33. STEETZIA.

Perianth on upper side of a continuous frond.
(Pl. xxxi.)

(b.) PERIANTH NONE.

34. SYMPHYOGYNA.

Calyptra on upper side of often stipitate frond; nerve narrow. (Pl. xxxii.)

35. METZGERIA.

Calyptra on under side of continuous frond; nerve narrow. (Pl. xxxii.)

36. SARCOMITRIUM (ANEURA).

Calyptra lateral; frond composed almost entirely of thickened nerve. (Pl. xxxiii-iv.)

C.—CARNOSÆ.—Fronds fleshy, with oblique scales on under side. (Pl. ii., f. 6, 8.)

(a.) FRUIT IMBEDDED IN SUBSTANCE OF FROND.

37. RICCIA. (Pl. i.)

(b. FRUITS TERMINAL ON THE UNDER SIDE OF FROND.

38. TARGIONIA.

Involute two-valved. (Pl. xxxiv.)

(c.) FRUITS, MANY ON THE UNDER SIDE OF A STALKED PELTATE RECEPTACLE.

39. MARCHANTIA.

Perianths opening downwards. (Pl. xxxv.)

40. REBOULIA.

Perianth none; involucre opening by two valves. (Pl. xxxv.)

41. FIMBRIARIA.

Perianth split into bands, cohering at their apices. (Pl. xxxv.)

D.—ANTHOCEROTÆ.—Frond fleshy, without scales beneath. (Pl. ii., f. 7.)

42. ANTHOCEROS. (Pl. xxxv.)



DETERMINING SPECIES.

The proper genus being determined, it will be advisable, in determining the species, to cut a small portion of the stem into very small fragments, in a drop of water on a glass slip, with a sharp knife. Cover the fragments with a thin glass cover, and examine them on the stage of the microscope. Most of the specific characters will then be distinctly seen as the fragments lay detached. A $1\frac{1}{2}$ -inch objective is the most generally useful power, but some species are so minute that a $\frac{1}{2}$ -inch, or even a $\frac{1}{4}$ -inch, objective will be found necessary.

Unless the student carefully reads the description of each species in the genus, he cannot hope to succeed in the correct specific determination.

The accompanying drawings of species will commend themselves to those persons desirous of making the acquaintance of this beautiful order of plants. They are copied, in most instances, from the best works on the subject, and more would have been inserted had we the required works in the Colony. In nearly every drawing the plant is shown in its natural size, with magnified representations of the leaves, their setting, stipules, &c.

GENERIC AND SPECIFIC DESCRIPTIONS.

1. PLAGIOCHILA, *Nees and Montagne.*

Perianth compressed. Stipules 0.

Stems from a creeping rhizome, erect, ascending, or creeping; often large and rigid. Leaves distichous, succubous, dorsal margin decurrent and reflexed, often obliquely. Stipules 0. Fruit terminal or lateral. Involucral leaves two, larger than the cauline. Perianth compressed at right angles to the insertion of the leaves; mouth truncate, entire, or toothed. Calyptra membranous. Capsule on a long or short fruit-stalk, ovoid; elaters with two spiral fibres. Antheridia covered by small imbricated ventricose perigonal leaves.

I. Stems sparingly branched. Leaves alternate, concave, more horizontal than vertical. Lower margin not much decurrent nor recurved.

1. *P. circinalis*, 1-3in. high.

II. Leaves more or less vertical, alternate, the margins recurved, dorsal decurrent.

* Stems erect from a creeping rhizome, tall, very much branched in a tree-like or fascicled manner. Leaves toothed and usually spinulose.

2. *P. fasciculata*, 3in. high.

** Stems not dendroid nor fascicled, either simple or dichotomous, or sparingly divided.

(a.) Leaves entirely or very slightly toothed, or 1-2 toothed at the apex.

3. *P. microdictyum*, 2-3in. high.

4. *P. Magellanicum*, 1½in. high.

5. *P., pusilla*, ¾in. high.

(b.) Leaves much toothed and spinulose.

6. *P. Stuartiana*.

7. *P. strombifolia*, 1-4in. high.

8. *P. deltoidea*, 2-4in. high.

9. *P. annotina*, 3-5in. high.

10. *P. Lyallii*, 2-3in. high.

11. *P. retrospectans*, 2in. high.

12. *P. bisirealis*, 2in. high.

1. *P. CIRCINALIS*, *Lehm*; Fl. Antarct. i., 348. Stems tufted, erect, branching, stout, 1-3in. high, olive brown. Leaves closely imbricate, erecto-patent, obliquely cordate, concave, quite entire or minutely toothed; margins recurved, dorsal gibbous; involucre similar, but large. Perianth obconic, compressed; mouth entire or slightly toothed.—Syn. Hep. 53, 652. *P. hemicardia*, Fl. Antarct. 148, t. 63, f. 2. Syn. Hep., 627.

Tasmania—Labillardiere. New South Wales; New Zealand.)

2. *P. FASCICULATA*, *Lindbg.* Stems ascending, dichotomous below, fastigiately branched above. Leaves obliquely orbicular-oblong, convex; ventral margin and apex unequally toothed. Perianth lateral and on the forks, long exserted, obovate; mouth compressed, obliquely truncate, ciliate. Syn. Hep., 27. Fl. Tasm., ii., 224. *P. Colensoi*.?—Tayl. in London Jour. Bot., 1846, 269. (Pl. iv., fig. 1, 2, 3.)

The specimens marked *P. aculeata*, in Herb. Hooker are precisely the common state of *P. fasciculata*; but amongst the specimens distributed under the name of *P. aculeata* some have been found to belong to *P. Stephensoniana*, a species not yet found in Tasmania. *P. uncialis* belongs to the same group. In Crypt. Antarct. the teeth on ventral side are too numerous, and the dorsal margin is not commonly toothed.

St. Patrick's River—Gunn. South Huon—Oldfield, Archer. Near Hobart—R. A. B.

3. *P. MICRODICTYUM*, *Mitten*, in Fl. N.Z., ii., 131, t. 94, f. 6. Stems 2-3in. high, slender, sparingly branched; branches with incurved tips. Leaves green, spreading, closely imbricate, deltoid-ovate, the angles rounded; dorsal margin quite entire, ventral sometimes slightly toothed; involucre a little toothed; perianth oblong, compressed. lips ciliate-toothed. (Pl. iv.)

St. Crispin's Well, Mt. Wellington, R. A. B. (New Zealand.)

4. *P. MAGELLANICA*, *Lindenberg.* Sp. Hep., p. 164. *P. Lindenbergiana*, *Lehm.* in Linn., iv., p. 367. *P. Sphalera*, Hook f. and Tayl. Fl. Antarct., p. 121. *P. unciiformis*, Syn. Hep., p. 653.

The Tasmanian species of this genus are larger than any of those collected at Cape Horn, and have all their leaves entire; in every other respect they correspond so nearly that they may be supposed to be one entire leaved

variety, similar to those observable in allied plants, as *A. falcata* and *P. retrospectans*. The inflexion of the dorsal margins of the leaves readily distinguishes *P. Magellanica* from its allies; the leaves themselves vary in being patulous or appressed; but their form is the same in all the plants described as above and referred to this species. (Pl. iv.)

In Lond. Jour. Bot., 1844, p. 457, *P. unciiformis* is described as with tufty stems a few inches wide, $\frac{1}{2}$ inch high, erect, nearly simple, apex uncinatè, leaves imbricate, erect, secund, appressed, ovato-rotundate; inferior margin gibbous, denticulate; upper incurved; base almost nerved; leaves increasing in size towards the top; cells minute. Related to *P. biserialis*, but not above one-fourth the size, denticulations more minute, not round and decurrent at the anterior margin, nor strikingly flexuose, as in that species.

Stems not more than $\frac{3}{4}$ inch high, curved.

5. *P. PUSILLA*, *Mont.*; *Lind. Sp. Hep.*, p. 164. Stems short, curved. Leaves denticulate, anterior margins not decurrent.

This plant is larger than *P. minutula*, the shoots of the latter being scarcely one-tenth of an inch high. *Lond. Jour. Bot.*, pp. 373 and 460.

Tasmania, Hb., Montagne. Among *Lepidozia ulothrix*, Hombron, (Voyage au Pôle Sud, *Crypt t.* 16, f. 3). Among *Chiloscyphus sinuosus*, Mt. Wellington, Gulliver.

6. *P. STUARTIANA* (Gottsche, in *Linnæa*, tom. 28, p. 548). Branches ascending, leaves obovate-cordate, apex rotundo-obtuse, dorsal margin suberect, entire, ventral margin arcuato-dentate. Near to *P. ambigua*, *Lindbg.* and *Hamp.* in *Linn.*, t. 24, p. 640.

Tasmania, Stuart.

7. *P. STROMBIFOLIA*, *Tayl.* Stems creeping, 2-4in. high, vaguely branched, branches ascending. Leaves more crowded and secund towards the top of the shoot, imbricate, semi-ovate, convex, slightly obtuse, upper margin shortly decurrent, ventral margin round, sparingly and unequally dentate, dorsal margin denticulate or entire. Fruit in forks. Perianth ovate, mouth dentate. *J. Strombifolia*, *Lond. Jour. Bot.*, 1844, p. 578. (Pl. 3, f. 1.)

Resembles *P. deltoidea* in appearance, but its leaves are less deltoid, and more of an ovate outline, and the

teeth are more spinous; the perianth, too, is of a different form, and there is no dorsal wing.

Tasmania—Hooker, Gunn, Oldfield. Mount Wellington—R. A. B.

8. *P. DELTOIDEA*, *Lindbg.* Variable in size and form; stems erect; branches somewhat fascicled, 2-4in. high. Leaves vertical, closely imbricate, subsecund, rhomboid-obovate; dorsal margin quite entire; ventral arched and the apex toothed. Perianth terminal, ovate, compressed; mouth toothed and ciliate. Syn. Hep. 55.

P. gregaria—Hook. f. and Tayl., Lond. Jour. Bot., 1844, 564.

Tasmania—Labillardière. A very fine large plant.

9. *P. ANNOTINA*, *Lindbg.* Fl. N.Z., ii., 131. Stems stout, erect, 3-5in. high, dichotomous. Leaves very closely imbricate, dimidiate-ovate, convex, obtuse, toothed and ciliate; ventral bases conniving and forming a crest. Perianth terminal and lateral, oblong, with a narrow-toothed wing; mouth truncate, compressed, fimbriate. Syn. Hep. 41, 643.

J. adiantioides, Hook. Musc. Exot. t. 90. (Pl. v., f. 1, 2, 3, 4.)

Tasmania. (New Zealand.)

Ventral margin and apex only spinous.

10. *P. LYALLII*, *Mitten* in Fl. N.Z., ii., 132. Stems erect, dichotomously and fastigiately branched, slender, flexuous, 2-3in. high. Leaves brown-green, rather remote and rigid, broadly ovate or semi-cordate; dorsal margin quite entire; ventral and apex spinous; involucre similar, more toothed. Perianth narrow, oblong-clavate, compressed; tips rounded, toothed. (Pl. v.)

St. Patrick's River—Gunn. Gullies Mt. Wellington—R. A. B. (New Zealand.)

The Tasmanian specimens are a little larger than those from New Zealand, but have the same habit, and the leaves a little more directed towards the ventral side.

Leaves dentate, one remarkable.

11. *P. RETROSPECTANS*, *Nees*. *P. ophisthotona*, Tayl. in Lond. Jour. Bot., 1844, p. 577. Tufts wide, olive-green. Stems 2in. high. Leaves clustered into a compressed capitulus at the top, which is bent back; each lower leaf is imbricated on at least one-half of the one immediately above, erect, adpressed even in the moistened state, rotundate or very widely ovate, obtuse, with a remarkable tooth on the summit, both margins

dentate; perichæatial leaves longer and more upright than the cauline, closely adpressed to the base of the calyx, which is three times their length. Perigonia in short slender spikes, usually terminal, of a brown colour, the leaves minute, tumid at the base and closely imbricated. The *P. biserialis* of *Lind.* and *Lehm.* approaches nearest to our plant in habit, but is far more slender, has the leaves smaller, and their teeth larger.

St. Patrick's River—Gunn. Near Hobart—M. Hombron. Brown's River and Mt. Wellington—Hooker, R. A. B. Dense tufts on rocks with *A. falcata*, Goat Hills—Oldfield.

Var. B., leaves entire. St. Patrick's River—Gunn. Western Mountains, Archer.

12. *P. BISERIALIS*, *L.* and *Lindg.* Stems 2in. high, strikingly flexuous. Leaves round and decurrent at the anterior margin, denticulate, bispinous at the apex. Lindenberg, *Sp. Hep.*, p. 126, t. 26.

Near to *P. retrospectans* in habit, but is far more slender, has the leaves smaller, and the teeth larger.—*Tayl. Lond. Jour. Bot.* 1844, 577. SEE *P. Magellanica*.

On an old stump of *Fagus Cunninghami*, at an elevation of 2000 ft.—Gunn. Wellington Falls—R. A. B.

2. LEIOSCYPHUS, *Mitten.*

Fruit terminal.

Perianth compressed; stems procumbent, stipulate.

Stems prostrate, creeping, or ascending; branches spreading. Leaves succubous, spinulose, distichous, close set, entire, rarely 2-fid. Stipules small, 2-4-fid. Fruit terminal. Involucral leaves like the cauline. Perianth dilated upwards, compressed at right angles to the direction of the leaves; mouth entire or toothed. Capsule on a slender fruitstalk. Antheridia in the bases of perigonial leaves, as in *Chiloscyphus*.

1. *L. CHILOSCYPHOIDES*, *Mitten*, in *Fl. Tasm.* ii., 225. Stems creeping, sparingly branched. Leaves subimbricate, semi-vertical, convex, orbicular; dorsal margin reflexed. Stipules small, free, distant, ovate, 2 partite; segments subulate, flexuous; margins 1-toothed.

Perianth elongate, obliquely obovate; lips dilated, incurved.—*Chiloscyphus amphibolius*, Nees, and *retusatus*, Hook. f. and Tayl., Fl. Antarct. 441, t. 161., f. 3. *Plagiochila*, Syn. Hep. 647. (Pl. vi.)

Among *Mastigobryum accretum*; St. Patrick's River—Gunn. St. Crispin's Well, Mt. Wellington—R. A. B. (Lord Auckland's Group, Fuegia, Falkland Islands.)

3. TEMNOMA, Mitten.

Perianth truncate.

From the truncate mouth of the perianth. Succubous, Perianth leafy. Fruit terminal. Perianth above 3-gonous. truncate.

Included in genus *Jungermannia* in Flora Tasm., and removed from that genus by Mitten.

1. T. PULCHELLA, Mitten. *J. pulchella*, Hook. Musc. Exot., t. 94. Fl. N.Z. ii., 128. Stems tall, erect, nearly simple. Leaves half vertical, subquadrate, 4-fid., very membranous. Stipules broad, 5-6-fid.; divisions obtuse, ciliated. Perianth tubular 3-gonous above; mouth truncate, fringed with long cilia that point in all directions. (Pl. vi.)

Tasmania—Oldfield. (New Zealand.)

4. LOPHOCOLEA, Nees.

Fruit terminal.

Perianth 3-quetrous; angles often alate; mouth 3-lipped, closed; stems procumbent, stipulate.

Stems prostrate, creeping. Leaves succubous, distichous, flaccid, decurrent at the base, 2-multifid. Stipules 2-4 cleft. Fruit terminal. Involucre of 2-4 large leaves. Perianth tubular below, 3-gonous above; lobes toothed and crested. Calyptra short, membranous, rupturing transversely at the base or irregularly at the apex. Capsule on a slender fruit-stalk, oblong; elaters and antheridia in the bases of the perigonal leaves.

* Stipules connate by the decurrent bases on one or both sides, with the leaves below them.

1. *L. heterophylloides*.
2. *L. Gunniana*.
3. *L. Tasmanica*.
4. *L. biciliata*.
5. *L. leucophylla*.

*Stipules free.

†Leaves entire, or nearly so.

6. *L. austrigena*.
7. *Nov. Zealandiæ*.

††Leaves 2-fid. or 2-dentate at the apex (not serrate).

8. *L. bidentata*.
9. *L. lenta*.
10. *L. amplectans*.
11. *L. decurva*.

†††Leaves toothed.

12. *L. muricata*.

1. **L. HETEROPHYILLOIDES**, *Nees*; Fl. N.Z. ii., 135. Stems $\frac{1}{2}$ inch long, procumbent, nearly simple. Leaves yellow-green, imbricate, horizontal or semivertical, flat, orbicular-ovate, rather retuse. Stipules 2-fid., ciliate, toothed at the base, decurrent and connate on one side to the leaf below. Perianth triquetrous; mouth 3-lipped, toothed. Syn. Hep. 157. *Chiloscyphus canaliculatus*, Hook. f. and Tayl. Lond. Jour. Bot. 1844, 563 (perianth inaccurately described); Syn. Hep., 710. (Pl. vii.)

Fragrant. On logs under water and on the earth and decayed wood: St. Patrick's River. York Town Rivulet—Gunn. Johnny's Creek, New Norfolk; Springs, Mt. Wellington—Hooker. Dense tufts on stones: Back River Gully, near the Derwent, Port Esperance, and Woodbourn, near Richmond—Oldfield. Rivulets, Cheshunt—Archer. Macrobie's Gully, Mt. Wellington, and gully near Mt. Nelson.—R. A. B. (New Zealand and Australia.)

2. **L. GUNNIANA**, *N. ab E.* Syn. Hep., p. 169; *Mitten*, in Fl. Tasm. 2, p. 225, n. 1. In tufts of grass; Hampshire Hills—Gunn, 1838. *Hb. Nees ab Essenbeck*. Also on logs under water in St. Patrick's River, Nov. 26, 1844—Gunn.

N. Fl. Tasm. This species is retained as distinct from the preceding, from the absence of decided intermediate specimens; but there are not wanting some

which seem to indicate that, like some forms of *L. Nov. Zealandiæ*, the form of the stipule may be considerably modified, as well as the habit of the plants, by the situation in which they may have grown.

3. *L. TASMANICA*, *Mitten*. Stems 1 in. long, procumbent, vaguely branched; leaves divaricate (in one plane), subovate, bidentate, with small sub-oblique sinus at the apices, rarely one-tooth on dorsal margin, united to the stipules; the stipules 4-toothed. Perianth prismatic, winged, wings dentate. (Pl. vii.)

Nearly allied to *L. connata*, Sw., and *L. Beechyana*, Tayl. From the first it differs in the form of the leaf and emargination, the sinus being narrower, and the cells have thinner walls; from *L. Beechyana*, as well as from *L. Martiana-Nees*, it recedes in the entire ventral margins of its involucreal leaves.

4. *L. BICILIATA*, *Mitten*. Fl. N.Z. ii., 137, t. 97, f. 4. Stems one inch long, procumbent, nearly simple. Leaves broad, spreading, brownish-green, loosely imbricate, deltoid-ovate, truncate, and 2-toothed, teeth slender. Stipules small, 2-partite; segments 2-toothed on one side.—*Chiloscyphus*, Hook. f. and Tayl. Lond. Jour. Bot., 1845, 84; Syn. Hep., 707. (Pl. iii., f. 2. Pl. vii.)

Brown's River—A. J. Taylor. Gully Mt. Wellington—H. J. Smith, R. A. B. (New Zealand.)

LOPHOCOLEA COLENSOI, *Mitt.*, is transferred to *Chiloscyphus*; it resembles *C. Coalitus*. (Pl. vii.)

5. *L. LEUCOPHYLLA*, *Taylor*. Syn. Hep., p. 155. Stems 2-3 in. long, slender, creeping, branched. Leaves pale-greenish or whitish-brown, closely imbricate, rather horizontal than vertical, convex, membranous, cellular, pellucid, triangular-ovate; margins strongly recurved, broadly connate, with the stipules sharply toothed all round. Perianth terminal; laciniaë entire, obtuse.—*Chiloscyphus*, Fl. Antarct., 157, t. 65, f. 4. Syn. Hep., 181, 706. (Pl. xiv.)

Tasmania, Hb., *Greville*. A few slender stems have been picked from amongst other *Hepaticæ* from the Acheron River, gathered by Mr. Gunn. Mt. Wellington—Gulliver; R. A. B. (New Zealand.)

6. *L. AUSTRIGENA*, *Taylor*, *Jung. Austrigena*, *Hook*, f. and *Tayl.* Fl. Antarct., p. 125 to 157, f. 7, and t. 158, f. 5; G. L. and N., Syn. Hep., p. 702. (Pl. viii.)
- Growing in water on the top of Fatigue Hill, eleva-

tion 4000ft. A smaller form submersed; St. Patrick's River—Gunn. Wet places in gullies near Brown's River—Oldfield.

7. *L. NOVÆ-ZEALANDIÆ*, *Nees*. Fl. N.Z. ii., 135. Stems procumbent, branched. Leaves yellowish-green, cellular, imbricate, spreading, orbicular quadrate, quite entire or slightly emarginate; involucrel oblique, 2-toothed. Stipules free, ovate, reflexed, 2-fid. Perianth terminal, obovate, 3-gonous, wingless, 3-fid.; segments unequally toothed. *L. subviridis*, Fl. Antarct., 438, t. 159, f. 4. *L. rivalis*, 437, t. 158, f. 7. *L. sabuletarum*, 437, t. 158, f. 8. *J. subintegra*, 443, t. 160, f. 5. Hook. Handbook, 510. (Pl. viii.)

Near Hobart—Hooker. Gully Mt. Nelson, Fern Tree Gully, and Macrobie's Gully—R. A. B. (New Zealand, Australia, Falkland Islands.)

8. *L. BIDENTATA*, *Nees*. Fl. N.Z., ii., 136. Stems variable in length, sparingly branched, prostrate. Leaves divaricating, flat, pale green, triangular ovate, flaccid, 2-dentate, with a shallow sinus. Stipules small, distant, 2-partite; segments 2-fid, entire, or toothed. Perianth sub-sessile, angles not or slightly winged; mouth laciniate and toothed. Syn. Hep., 157. *J. recurvifolia*, Hook f. and Tayl. Lond. Jour. Bot., 1844, 562. *J. leptantha*, *J. divaricata*, and *J. alternifolia*, Fl. Antarct., t. 159, f. 6 and 161, f. 2 and 8. *J. textilis*, Fl. Antarct., 435, t. 158, f. 9; Fl. N.Z., ii., 137. Hook. Handbook, 510. (Pl. viii.)

Tasmania—Stuart. Banks of the Derwent, Springs, Mt. Wellington. Deep Gully, Mt. Wellington; high-bleak hill, Major's Falls, New Norfolk. In brackish swamps near the sea, N. West Bay—Oldfield. Ches-hunt—Archer. Gully, Mt. Wellington—R. A. B. (New Zealand.)

9. *L. LENTA*, *Hook* f. and *Tayl*. Fl. Antarct., 154; Fl. N.Z., ii., 136, t. 97, f. 2. *J. diademata*, Lond. Jour. Bot., 1844, 560. Patches thin, several inches wide, pale dusky olive. Stem about one inch long; the branches few, patent. Leaves scarcely imbricated, lying in the same plane, oblong, the outline swelling out about the middle of the anterior margin, their cells large, their sinus obtuse, the segments much divaricated. The stipules have four setaceous segments, which are quite entire. The perichæial leaves are more erect, wider, and their margin is more waved than the cauline; they are sometimes sparingly dentate. The

oblong triquetrous calyx has the mouth beautifully fringed, and one lip much longer than the other; it has usually three wings, which are strongly dentate. The perigonia occur about the middle of a shoot, and consist of closely imbricated, adpressed, upright leaves, ventricose at the base, their points standing out from the stem; the stipules of the perigonia are less compounded than those of the rest of the stem, being, for the most part, simply bifid. The capsule is oblong, splitting into four elliptical valves, discharging numerous minute round seeds and spiral filaments, with a double helix.

This species approaches the European *J. bidentata*, *L.* differing from it by its smaller size, more deeply notched leaves, their segments more elongated, by the quadrifid stipules with entire segments, but, above all, by the inequality of the two lips of the calyx. Lond. Jour. Bot., 1844. (Pl. viii.)

Near Hobart—Hooker, Archer. (New Zealand, Fuegia.)

Scarcely different from *L. bidentata*. Hook. Hd. Book, n. 511.

10. *L. AMPLECTENS*, *Mitten*. Stems tufty, decumbent, vaguely sub-pinnately branched; leaves imbricate, sub-quadrangle, 2-fid, lacinia acute, amplexant. Stipules ovate, 2-fid, outer segments one-toothed. (Pl. ix.)

Yellow-green or brownish. In size and habit very nearly resembling the European *Harpanthus scutatus*, *Spruce* (*J. scutata*—Hook.), but its leaves and stipules are of a different form, and were it not for the form of the stipule being exactly that which prevails in almost all the species of *Lophocolea*, it would rank nearer to some *Jungermannia*.

Amongst rocks near the top of Mt. Wellington—Oldfield.

11. *L. DECURVA*, *Mitten*. Stems procumbent, nearly simple; leaves ovate, bidentate, sinus small, dorsal margin long, decurrent, ventral arcuate; stipules wide, ovate, inflexed, tri-partite, teeth recurved, subulate. (Pl. ix.)

Beautiful green, one inch high, slender; leaves imbricate, apices decurved; stipules large, concave.

A small plant, readily distinguishable by its concave stipules, which have their two slender teeth bent back. In general appearance it has more resemblance to some small forms of *Plagiochila Mauritiana*—*Nees*, than to any *Lophocolea*. (Fl. Tasm., n. 227.)

12. *L. MURICATA*, *Nees*. Stems minute, $\frac{1}{8}$ in. to $\frac{1}{4}$ in. long, procumbent, branched. Leaves close set, pale, sub-horizontal, and stipules sub-quadrate-ovate, acutely 2-dentate, spinulose-ciliate, muricate, with short hairs above. Perianth terminal, ovate, plaited; mouth 5 to 6-fid. *Syn. Hep.*, 169, 703. *L. hirtifolia*—Hook. f. and Tayl. *Lond. Jour. Bot.*, 1846, p. 366.

On *Sticta chloroleuca*—Hook. On the old fronds of a fern, St. Patrick's River—Gunn. (New Zealand, South Africa, South America, Java, India.)

5. TRIGONANTHUS, *Spruce*.

Perianth trigonous, stipulate near fruit.

Stems procumbent. Succubous, perianth leafy, trigonous, mouth contracted, fruit terminal. Approaches *Lophocolea*, but the perianth is different, and the stipules usually wanting on the barren stems. The Tasmanian species is *J. dentata*.

Included in Genus *Jungermannia* in *Flor. Tas.*, and removed from thence by Mitten.

1. *T. DENTATA*, *J. dentata* (*Raddi*; *G. L. and N. Syn. Hep.*, p. 143.) Stems creeping, with erect branches, swelling at the tips. Leaves rather remote, broader than the stem, sub-vertical, complicate-concave, orbicular-ovate, 2-fid. to the middle, toothed; involucrel numerous, imbricate, deeply 2-fid. Stipules subulate. Perianth narrow, membranous, 4-plicate, mouth denticulate. (*Pl. ix.*)

On charred wood near York Town—Gunn. On rotten timber, Grass Tree Hill—Hooker. Common, New Norfolk—Oldfield, Archer. Ben Lomond—De Bomford. Huon Road—Rodway. On charred wood, gully, Kangaroo Point—R.A.B. (New Zealand, Europe.)

These specimens, in colour and habit, agree very nearly with *J. divaricata*, described by Dr. Taylor as *J. exiliflora*. May be distinguished by the braided appearance of the leaves, and the margins everywhere recurved. At the base at the outer side they are sometimes spiruloso-papillose, but the small teeth of the edges, from their downward direction, often present the same appearance when the papillæ are absent. *Fl. Tas.*

6. JUNGERMANNIA, *Linn.**Perianth tubular. Stipules 0.*

Stems prostrate, creeping. Leaves succubous, distichous, entire, or lobed. Stipules usually present. Fruit terminal on the main stem or on a lateral branch. Involucral leaves free. Perianth tubular, angular; mouth toothed or laciniate. Calyptra usually included. Capsule ovoid or globose, on a slender fruitstalk; elaters with 2 spiral fibres. Antheridia in the bases of inflated perigonal leaves.

Minute. Leaves distant.

1. *J. PERIGONIALIS*, *Hook. f. and Tayl. Fl. Tasm., ii., 222.* Minute; stems slender, $\frac{1}{2}$ in. high. Leaves dark-brown or purplish, distant, suberect, secund, concave, semi-amplexicaul, ovate-orbicular or obovate, retuse or unequally 2-fid at the apex, quite entire; involucral acutely 2-dentate. Perianth tubular, elongate; mouth plicate, contracted, toothed. (Pl. x.)

Stems dark, leaves rather glossy, brown.

Rocks near Cummings' Head, Western Mountains—Archer.

Leaves acuminate.

2. *J. MONODON*, *Hook. f. and Tayl. Fl. N.Z., ii., 128.* Stems 1-2 in., purple or brown, flexuous. Leaves closely imbricate, ovate-lanceolate, acuminate, oblique, sometimes a tooth on one side; involucral 2-multifid, toothed. Perianth oblong, 4-plicate, mouth ciliated. *Syn. Hep., p. 664. Lond. Jour. Bot., 1844, p. 559.* (Pl. x.)
Tasmania—Spence, Gunn. New Zealand—Hooker.

Leaves oblong, recurved.

3. *J. TASMANICA*, *Hook. f. and Tayl.* Stems tufted, ascending, branched. Leaves imbricate, patent, oblong, margin recurved, entire. Perianth terminal, oblong, tumid, subincurved, 4-plicate; mouth minutely denticulate. Involucral leaves 2-digitate, laciniate. Perianth appressed. *J. revolvens*, *Hook. f. and Tayl. Lond. Jour. Bot., 1846, p. 275.* (Pl. ii., f. 1. Pl. x.)

Yellowish-green. Vaguely branched, creeping or ascending. Leaves ovate-oblong, obtuse, sometimes retuse; margin recurved. Patches wide, pale olive-green. Stem about lin. long, irregularly branched, creeping, the new shoots ascending. Both margins of

the leaves recurved, as in several *Plagiochila*; the cellules large at the junction of the leaves to the stems. No stipules except a few almost inconspicuous towards the tops of the male shoots. Calyx curved, as in *J. lanceolata*, L. The perichæatial leaves or scales are concealed by the adjoining pair of cauline leaves; they are anomalous, being deeply laciniated; by which character, and by the recurvation of both margins of the leaves, our present plant differs abundantly from *J. lanceolata*, L. Lond. Jour. Bot., 1846, p. 275.

Circular Head, York Town—Gunn. Brown's River Gully—Oldfield. Wellington Falls and Proctor's Road—R. A. B.

Furnished with scaled flagellæ.

4. *J. COLORATA*, *Lehmann*. Stems one to two inches high, purple or dusky green, sending off long thread-like flagellæ covered with scales. Leaves closely imbricate, nearly vertical, orbicular, quite entire; involucrel incised. Stipules 0. Perianth ovoid, 8-10-plicate; mouth contracted, toothed. Syn. Hep., 36 and 673. (Pl. x.)

On a stunted *Fagus*, altitude 2000 ft., St. Patrick's River—Gunn. On rocks, Goat Hills, New Norfolk; Grass Tree Hill and Hospital Bay, South Huon—Oldfield, Archer. Near Hobart and Wellington Falls—R. A. B. (New Zealand, Australia, South Africa, Juan Fernandez, Chili, Fuegia, &c.)

Leaf margin thickened.

5. *J. MARGINATA*, *Mitten*. Stems erect, rigid, branched; branches frequently attenuated in a flagelliform manner; leaves patent, secund from the front, oval, entire, apex obtuse or rarely retuse, margin thickened, composed of two rows of cells; stipules ovate, bifid.

Dull brownish-green or black. Stems two inches or more in height, flexuous; stipules as wide as the stem is thick.

A rigid species, with some resemblance to elongated states of *J. scalaris*, but larger and with more oval leaves. Its evidently margined leaves readily distinguish it from its allies. (Pl. xii.)

Arthur's Lakes—Gunn. Brown's River Gully—Oldfield. Wellington Falls—R. A. B.

Leaves whitish, divided.

6. *J. MULTICUSPIDATA*, *Hook. f.* and *Tayl.* Fl. Antarct., 150. Stems loosely tufted, prostrate, sparingly branched. Leaves distant, whitish, suberect, membranous, pellucid, obovate, 2-4-fid. to the middle, sinus obtuse, segments acute. Perianth lateral or terminal, long, cylindric, split at the side, mouth 3-4-toothed. Syn. Hep., 686.

On *B. Halleriana*—Archer.

7. *J. BASTOVII*, *Carr.* and *Pear.* Roy. Soc. Trans. Tas., 1887. Monoicous, cladocarpous, pale glaucous green; stems slightly branched, creeping, filiform, rigid; branches lateral; leaves approximate, nearly transverse, subsecund, subquadrate, ovate, convexo-conducuplicate, divided half way down into two acute spreading segments, sinus acute, margin entire, exstipulate; involucre on short lateral branches; perigonal leaves 4-6 pairs, turgid at the base, monandrous. (Pl. xi. and xl.)

Ploughed Fields, Mount Wellington—R. A. B.

8. *J. TERES*, *Carr.* and *Pear.* Roy. Soc. Trans. Tas., 1887. Dioicous, densely cæspitose, flagelliferous; reddish brown colour; stems sub-ramose, terete, wiry, rigid, filiform, flexuose, branches postical; leaves closely appressed, imbricate, sub-amplexicaul, erect, broadly ovate, obtuse, margin hyaline, entire; under leaves none; involucre bracts much larger, laciniate-dentate, bracteole ovate-acute, slightly dentate; perianth ovate cylindric, deeply 4-6-plicate, mouth incurved, denticulate. (Pl. xi. and xlii.)

Mt. Wellington—R. A. B.

7. SOLENOSTOMA, *Mitten.*

This genus includes *Jungermannia rotata*. The perianth adheres to the base of the uppermost leaves. *Hook. Handbook Flora N.Z.*, p. 753.

Leaves quite entire.

1. *S. ROTATA*, *Mitten.* *Jungermannia rotata*, *Hook f.* and *Tayl.* Fl. N.Z., ii., 129, t. 24, f. 4. Stems procumbent, tufted, branched, recurved, flexuose, 1-3 in. high. Leaves imbricate, dark green, secund, erecto-patent, almost vertical, orbicular, concave, quite entire, ventral margin sub-decurrent; involucre similar. Stipules

appressed, lanceolate, or none. Perianth obovate, above obtusely 4-gonous, with four inflexed laminae. Syn. Hep., 672. (Pl. xi.)

Wellington Falls—R. A. B.

8. ADELANTHUS, *Mitten.*

Fruit apparently lateral. Stipules 0.

Stems erect from a creeping rhizome, branched. Leaves succubous, distichous, vertical, the dorsal margin decurrent. Stipules 0. Fruit terminal on short ventral branchlets, concealed at the bases of the branches. Involucral leaves 3-farious. Perianth tubular, subtrigonous; mouth connivent, toothed. Capsule on a slender fruitstalk. Elaters with two spiral fibres. Antheridia in small ventral spikes.

1. *A. FALCATUS*, *Mitten* in Journ. Linn. Soc., vii., 243. *Plagiochila*, Flor. Tas., ii., 223. *J. falcata*, Hook. Musc. Exot., t. 89. Stems much branched, 1-3 in. high; branches falcate, incurved, thickened upwards. Leaves dingy green, or brown, or black, imbricate, vertical, erect, sub-opposite, orbicular; dorsal margin sub-inflexed, quite entire, decurrent; ventral toothed. *Auricularia occlusa*, Fl. Antarct., 146. Syn. Hep., 619. (Pl. xii.)

Stems 3 in. or more in height, the leaves erectopate and rather loosely disposed; in the lower parts of the stems they are quite entire, but as they approach towards the apex they become more and more denticulate. Flora Tas.

Tasmania—Gunn, Archer. Kermadie Rivulet, South Huon—Oldfield. St. Crispin's Well, Mount Wellington—R. A. B. (New Zealand, Campbell's Island.)

9. CHILOSCYPHUS, *Corda.*

Fruit lateral, stems procumbent, stipulate.

Stems prostrate, creeping, rooting from the bases of the stipules. Leaves succubous, distichous, decurrent. Stipules often decurrent and connate with the leaves below them. Fruit terminal on very short lateral branches. Involucre of 2-6

leaves. Perianth 2-3 partite. Calyptra herbaceous, globose or clavate, often longer than the perianth, bursting irregularly at the apex. Capsule ovoid, on a slender fruitstalk; elaters with two spiral fibres. Antheridia in the saccate dorsal bases of perigonial leaves, which resemble the cauline.

I. Leaves opposite, stipules united to both the leaves below them by their decurrent margins.

*Leaves united by their dorsal bases (free in *J. Billardieri*.)

†Leaves entire, or nearly so, at the apex.

1. *C. conjugatus*.
2. *C. Billardieri*.
3. *C. Gunnianus*.
4. *C. sinuosus*.

††Leaves strongly 2-5 dentate at the apex.

5. *C. fissistipus*.

**Dorsal bases of the leaves not connate.

†Leaves 2-4-toothed at the apex.

6. *C. coalitus*.
7. *C. Colensoi* (?)

II. Leaves alternate, stipules united by one decurrent margin to a leaf below them.

8. *C. laxus*.
9. *C. tridentatus*.

III. Leaves opposite or alternate, stipules free.

10. *C. echinellus*.
11. *C. cymbaliferus*.

1. *C. CONJUGATUS*, *Mitten*. Stems creeping, elongate, sparingly dichotomously branched; leaves imbricate, oblong-rotund, united at the dorsal margin, remotely spinulose-dentate at the base or entire, opposite. Stipules half as large as the leaves, incurved, sparingly denticulate. Cells of leaves minute, round. Fl. Tas., ii., p. 228. (Pl. xiii.)

Without exception the largest species of the genus. In external appearance and colour it resembles *C. Billardieri*, but the form of its leaves, and particularly that of the stipules, which resemble nothing so much in outline as the human occiput as seen from behind, render it very distinct from all allied species. The united dorsal

margins cross the stem transversely without the least tendency to decurrence. The apices of the leaves being a little incurved, and the leaves themselves sub-concurrent, give the plants a canaliculate appearance.

Rivulet near Acheron River—Gunn.

2. *C. BILLARDIERI*, *Nees*. Fl. N.Z., ii., 139. Stems 3-5 in. long; prostrate, dichotomously branched. Leaves green or brown, opposite, ovate, subacute, obscurely 2-dentate; ventral margin arched; dorsal straight, 6-9-toothed at the base, free or connate with that of opposite leaf. Stipules imbricate, transverse, convex, 2-toothed, connate with the leaves below. Perianth campanulate; mouth laciniate, fimbriate. Hook. Musc. Exot., t. 61. Syn. Hep., 175. (Pl. viii.)

Tasmania—Labillardière, Menzies. (Australia, New Zealand, Campbell's Island.)

3. *C. GUNNIANUS*, *Mitten*. Stems creeping, vaguely branched. Leaves imbricate, sub-deltoid, bispinous at the apices, dorsal margin spinous dentate, ventral margin bi-dentate, suddenly arcuate to the stipule. Stipule oblong, apex bi-dentate, extus 4-toothed.

Stem 2 in. high, flaccid. Dirty pale brown. (Pl. xiii.)

A remarkable species, possessing considerable resemblance to *C. Billiardieri* in the general outline and dentation of its leaves, but its areolation is altogether different. Fl. Tas., ii., p. 228.

Tasmania—Gunn.

4. *C. SINUOSUS*, *Nees*, Fl. N.Z., ii., 141. Stems 3-4 in. long, procumbent. Leaves crowded, brownish green, opposite, ovate-oblong, obtuse, obscurely 2-toothed at the apex, connate, or almost so, by their dorsal bases; ventral margin undulate; dorsal very decurrent; involucrel incised. Stipules distant, spreading, 5-partite, segments toothed, connate with the leaves below. Perianth ovate; mouth laciniate, inflexed. Syn. Hep., 175. Hook. Musc. Exot., t. 113. (Pl. xiii.)

C. oblongifolius, Hook. f. and Tayl. in Lond. Jour. Bot., 1845, 563. This species bears some resemblance to *J. integrifolia*, L. and L.; in this, however, the termination of the leaf is altogether destitute of the two remarkable teeth present in our species. Syn. Hep., 705.

Valleys near Hobart, North West Bay Gully—Oldfield. Mount Wellington Gullies—R. A. B. (New Zealand, Lord Auckland's Group.)

5. *C. FISSISTIPUS*, *Hook. f. and Tayl. Fl. Antarct.*, 157. Stems $\frac{1}{2}$ in. to 1 in. long, procumbent, branched. Leaves ovate, united by their dorsal bases, 2-4-toothed at the apex; ventral margin undulate, 1-2-toothed; dorsal straight; involucre 2-3-fid; margins toothed and lacinate. Stipules imbricate, reniform, spinulose, connate with the leaves below them. Perianth campanulate; mouth open, lacinate. *Syn. Hep.*, 175 and 704.

Tasmania—Labillardière. St. Patrick's River and Circular Head—Gunn. Back River Gully—Oldfield. Tents Creek—Archer. Mount Wellington Gully—R. A. B. (New Zealand, Lord Auckland's Group.)

6. *C. COALITUS*, *Nees. Fl. N.Z.*, ii., 141. Stem 1 in. long, creeping. Leaves opposite, ovate-quadrate truncate, 2-dentate; teeth subulate; involucre small, 2-fid. Stipules 4 to 6-toothed, connate with the leaves below them. Perianth obovate; mouth 4-toothed. *Hook. Musc. Exot.*, t. 123. *Syn. Hep.*, 180, 706. (Pl. xiv.)

Tasmania—Gunn, Hooker. Back River Gully and Mount Wellington—Oldfield. West End Rivulet—Archer. Mount Wellington Gully—Rodway, R. A. B. (New Zealand, Lord Auckland's Group, Java.)

7. *C. COLENSOI* (?) *Lophocolea Colensoi*, Mitten in *Fl. N.Z.* ii., 138, t. 97, f. 6. Stems 2-3 in. long, creeping, branched. Leaves brownish-green, imbricate, ovate oblong, truncate, shortly 2-dentate; teeth sometimes obsolete. Stipules 2-partite; segments 1-toothed on each side. (Pl. vii.)

Resembles *C. coalitus*, but is larger, more succulent, the dorsal angles of the leaves are more widely separate; perianth short, campanulate; lips toothed, not exerted beyond the leaves. Mitten in *Hooker's Handbook to N.Z. Flora*, p. 753.

The figure of this plant in *Fl. N.Z.* and the description do not appear to agree, the stipule being drawn as 2-toothed on each side.

Mount Wellington Gully—R. A. B.

8. *C. LAXUS*, Mitten in *Fl. N.Z.*, ii., 142, t. 99, f. 1. Stems 2 in. long, brittle. Leaves bright green, sub-pellucid, alternate, rather remote, ovate oblong, unequally 3-4-toothed; cells large, lax. Stipules small, 2 partite; segments 1-toothed. (P. xiv.)

Amongst *Symphyogyna flabellata* and *Lepidozia tenax*, Gunn. With *Radula buccinata* and *Metzgeria*

furcata ; Back River Gully ; North-West Bay Gully—Oldfield. Gully, Mount Wellington—R. A. B. (New Zealand.)

9. *C. TRIDENTATUS*, *Mitten*. *C. combinatus*, Fl. N.Z., ii., 141. Stems procumbent, slender, 1 in. long. Leaves brownish-green, convex, rigid, shortly oblong or sub-quadrate, truncate, 2 or 3 toothed at the apex ; margins recurved ; stipules small, 4-toothed, connate on one side with a leaf below. (Pl. xiv.)

Tasmania—Dumont d'Urville — Archer. Damp ground, Grass Tree Hill—Oldfield. St. Patrick's River—Gunn. (New Zealand.)

10. *C. ECHINELLUS*, *Mitten* in Fl. N.Z., ii., 141. Stems small, procumbent. Leaves sub-imbricate, horizontal, sub-rotund, spinulose toothed. Stipules 2-partite ; segments lanceolate-subulate, toothed. *Lophocolea*, Syn. Hep., 703.

Creeping amongst mosses—Archer. (New Zealand.)

11. *C. CYMBALIFERUS*, *Hook. f. and Tayl.* *Jungermannia*, Fl. Antarct., 151, t. 64, f. 5. Stems tufted, 1 in. high, sub-erect or procumbent, curved. Leaves pale green or yellowish, flaccid, pellucid, densely and closely imbricate, erecto-patent, very concave, subsecund, obliquely orbicular, serrulate ; dorsal margin produced into an obovate inflated auricle. Stipules free, very broad, transverse, tumid, closely imbricating, obscurely 3-lobed or quite entire. Perianth lateral, ovate-oblong, tumid below, compressed below the plaited toothed mouth. Syn. Hep., 711. A very peculiar plant. (Pl. xv.)

Mount Wellington—Mossman, R. A. B. (New Zealand.)

12. *C. LIMOSUS*, *Carr. and Pear.* Roy. Soc. Tran. Tas. 1887. Dioicous ; tufts shallow, depressed, sordid green ; stems sparingly branched ; leaves complanate, nearly opposite, imbricate, ovate-triangular, rounded at the apex, sometimes retuse, decurrent ; under leaves connate with the adjacent leaves, patent, cuneate-quadrate, quadrifid, divided half way into four acute equal segments ; involucrel bracts connate about half way, irregularly dentate ; perianth cyathiform, slightly alate, mouth wide, tri-laciniate-alate, irregularly sinuate dentate ; andrœcium amentiform, minute ; antheridia single, oval. (Pl. xv. and xxxix.)

Brown's River—R. A. B.

10. PSILOCLADA, Mitten.

Fruit lateral, stems procumbent; leaves and stipules deeply cleft.

Hirsute; stems capillary, creeping, sub-pinnately branched. Leaves succubous, distant, minute, quadrate, 4-cleft. Stipules similar. Fruit lateral, on very short branches. Involucral leaves 2-fid, large, falcate. Perianth sub-cylindric, smooth; mouth laciniate; laciniæ falcate, secund. Calyptra, &c. unknown.

1. *P. CLANDESTINA*, *Mitten*, *Fl. N.Z.*, ii., 143, t. 99, f. 4. Stems 1 in. long, capillary, procumbent, sparingly branched. Leaves bright green, microscopic, scarcely broader than the stem, remote, square in outline, consisting of a short horizontal blade and 4 erect subulate lobes at right angles to it; cells large, inflated; involucral, imbricate, large, falcate-secund, more cut. Stipules similar, smaller. (Pl. xv.)
Tasmania—Gunn. (New Zealand.)

11. GYMNANTHE, Tayl.

Stems prostrate or ascending, vaguely branched. Leaves succubous, distichous. Stipules present or absent. Fruit terminal. Involucre a cylindrical pendulous tube, often fleshy and buried in the ground. Perianth 0 or adnate with the involucre. Capsule on a slender fruitstalk; elaters with two spiral fibres. Antheridia free in the axils of the leaves.

This genus has been divided by Mitten into five in Hooker's Handbook to N.Z. Flora, p. 753, the name *Gymnanthe* being too near *Gymnanthes* and *Gymnanthus*.

GYMNANTHE (Divided).

Perianth, a descending fleshy bag.

I. Fruit terminal.

* Stems erect or ascending, leaves nearly entire, stipules 0.

11. *TYLIMANTHUS*, *T. saccata*, *T. Tenella*.

** Stems procumbent, leaves 2-fid, stipules small or none.

12. *ACROBOLBUS*, *A. cinerascens*.

*** Stems procumbent, leaves entire, stipules 0.

13. LETHOCOLEA, *L. concinna*, *L. Drummondii*.

**** Stems procumbent, stipulate.

14. BALANTIOPSIS, *B. diplophylla*.

II. Fruit lateral.

Stems erect or ascending, stipules 0

15. MARSUPIDIUM, *M. Urvilleana*.

11. TYLIMANTHUS, *Mitten*.

Perianth, a descending fleshy bag.

Fruit terminal.

Stems erect or ascending ; leaves nearly entire ; stipules 0.

1. T SACCATA, *Gymnanthe saccata*, *Tayl.* in *Fl. Antarct.* 153. Stems erect from a creeping rhizome, 2-3 in. long, flexuous, fertile incurved. Leaves distant, 3 farious, distichous, ovate-quadrate, flat, decurrent, truncate, emarginate ; ventral margin and apex toothed ; dorsal sub-reflexed, entire. Involucre terminal, fleshy. *Hook. Musc. Exot. t. 16, G. tenella*, *Hook. f. and Tayl. Fl. N.Z. ii., 143.* *Syn. Hep., 192, 712.* *Fl. Tasm. ii., 229, t. 179, f. 3, J. abbreviata*, *Hook. f. and Tayl. in Lond. Jour. Bot. 1843, 374.* *Syn. Hep. 647 (Plagiochila), Pl. xvi.*

Oven's Creek, *Archer*, Fork Creek, *Rodway* (New Zealand, Lord Auckland's Group, Fuegia.)

A common and variable plant, *G. tenella*, seems to be a small state of it. *Hook. Handbook Fl. N.Z.*

2. T. TENELLA, *Gymnanthe tenella*, *Tayl.* in *Lond. Jour. Bot. 1844, p. 377.* Stem simple, ascending. Leaves sub-imbricate, erecto-patent, concave, sub-secund, obovate from a narrow base, apex very obtuse, bilobed, dentate. Receptacle elongate, obconic, striate. *Pl. xvi.*

Stems scarcely tufted, erect, slightly incurved above, from one to three inches long, prolonged at the top by annual innovations arising from the base of the perichastium, when this is present. The leaves, in the series from the base to the summit of the stem, are constantly increasing in size. The receptacle is elongate, obconical, of a pale tawny colour, striated ; the barren pistilla are crowded, erect, linear, covered by a pair of lacinated scales, descending at a considerable angle from the stem and emitting rootlets. The perigonia are spikes situated in the course of the stems, and have leaves closely imbricated, erect, swollen

at their bases, each containing several dusky oblong anthers whose pedicels are elongated.

Fl. Tasm.—It appears by no means improbable that *G. saccata*, *G. tenella*, and *G. Urvilleana* are different states of the same species. St. Patrick's River, Gunn. Mount Wellington, Oldfield, Mossman; Cheshunt, Archer. St. Crispin's Well, R. A. B. (New Zealand, Fuegia).

ACROBOLBUS, *Lehm.* and *Lindb.*

Perianth, a descending fleshy bag.

Fruit terminal.

Stems procumbent, leaves 2-fid, stipules small or 0.

1. *A. CINERASCENS*, *Gymnanthe cinerascens*, *Lehm.* and *Lindb. Mitten. Jungermannia cinerascens*, *Lehm.* and *Lindb.* in Pug. Pl. 4. p. 46; G. L. and N. Syn. Hep. p. 78.

Note.—Fl. Tasm. ii., 229. Although the perfect torus of this species (*Gymnanthe cinerascens*) is wanting, there are sufficient indications present in the specimens to warrant its being placed in this genus. The stipules, overlooked in the description of the plants in the "Synopsis Hepaticarum," are nevertheless present as well in the specimen kindly contributed by Dr. Lehman as in those gathered by Mr. Gunn, but they are not obvious on all the stems, and are thus easily overlooked. The involucreal leaves scarcely differ in form from the cauline, but are concave, and enclose four or five pistils seated on the dorsal side of the abrupt and slightly thickened apex of the stem itself; within the involucre there has been observed a small stipule-like leaflet, but not apparently representing the stipule, which, although present, has no part in the formation of the torus in the plants of this and allied genera. Pl. xvi.

St. Patrick's River, Gunn.

13. LETHOCOLEA, *Mitten.*

Perianth, a descending fleshy bag.

Fruit terminal.

Stems procumbent, leaves entire, stipules 0.

1. *L. CONCINNA*, *Gymnana concinna*, *Mitten*, in Fl. Tasm.

ii., 230. Stems creeping, 3 to 8 lines long, branched. Leaves imbricate, oblong, ovate, concave, pale green, under surface scattered with rootlets, fruit descending from the apex.

A very small species of a very neat habit, and with somewhat the look of the stems of some states of *Jungermannia nana*, Nees. The apex of the stem is slightly thickened and curved downwards, and the involucre leaves being directed upwards at right angles, give the stems of this and some allied species an abrupt appearance. The areolation is similar to that of *G. Urvilleana*. Pl. xvi.

Tasmania, *Gunn*, creeping over *Jungermannia Tasmania*.

2. L. DRUMMONDII, *Mitten* in Fl. N.Z. p. 144, Pl. 99, f. 8. Stems $\frac{1}{2}$ in long, stout, creeping, rooting at the tips. Leaves greenish-brown, imbricate, spreading, flat, upper larger, ovate, obtuse, quite entire; dorsal margin sub-recurved. Involucre as long as the plant, clavate, with scattered rootlets. *Riccia squamata*, *Tayl.* in Drummonds Swan River mosses. *Podanthe squamata*, *Tayl.* in Lond. Journ. Bot. 1846, p. 413. Syn. Hep. 789. Pl. xvii.

Bogs, Brown's River, *Oldfield*. (Australia, New Zealand.)

14. BALANTIOPSIS, *Mitten*.

Perianth, a descending fleshy bag.

Fruit terminal

Stems procumbent, stipulate.

1. B. DIPLOPHYLLA, *Mitten*, in Fl. Tasm. ii., 230, t. 179, f. 5. Stems short, $\frac{1}{2}$ -lin. in length, creeping. Leaves white, pellucid, membranous, cellular, closely imbricate, divaricating, conduplicate, unequally 2-lobed, upper lobe smaller, stipuliform, toothed and ciliate. Stipules 2-fid; segments toothed and ciliate. Perianth terminal, short, cylindric, purple. *J. diplophylla*, Fl. Antarct. 152, t. 64, f. 4. *Gotschea*, *Nees*. Syn. Hep. 624. Pl. xvii.

Bogs, Brown's River, and wet ground, Kermantie Rivulet, *Oldfield*. Elliot Rivulet, *Archer*. Fork Creek, *R.A.B.*

15. MARSUPIDIUM, *Mitten.*

Perianth, a descending fleshy bag.

Fruit lateral.

Stems erect or ascending, stipules 0.

1. *M. URVILLEANA*, *Gymnanthe*, *Tayl.* in *Fl. Antarct.*, 153. Rhizome creeping. Stems tufted, $\frac{1}{2}$ -2in. high, erect, tips nodding. Leaves spreading or appressed and imbricate, nearly round, with an indistinct notch or with one or two short teeth at their tops. Involucre attached to the lower parts of the stem by its side, rooting. Capsule on a long stalk, ovoid. *Plagiochila Urvilleana*, *Mont.* in *Voy. Pole Sud.*, t. 16. *Jung. abbreviata*, *Hook. f.* and *Tayl.* in *Lond. Jour. Bot.*, 1844, 374. *Syn. Hep.* 647 (*Plagiochila*).

Tasmania, *Gunn*, *Hooker*, *Archer.* (New Zealand, Lord Auckland's Group.)

16. GYMNOMITRIUM, *Corda.*

Perianth, 0.

Stems very slender or capillary. Leaves vertical, distichous, flat or concave, entire or 2-lobed. Stipules 0 or very inconspicuous. Fruit terminal. Involucral leaves, 2-4, convolute, emarginate. Perianth 0. Calyptra short. Capsule globose on a slender fruit stalk; elaters with 2 spiral fibres. Antheridia axillary, obovate.

1. *G. CONCINNATUM*, *Corda.*—*Jungermannia*, *Fl. N.Z.* ii., 128. Stem erect, short; branches straight, thickened, obtuse and compressed at the apex. Leaves most densely imbricate, ovate, 2-fid, with a narrow membranous border. Stipules 0. *Hook. Brit. Jung.* t. 3. Pl. xviii.

Densely matted, pale yellowish brown. Small. Summit of Mount Wellington, *R. A. B.* (New Zealand, Europe, Fuegia).

2. *GYMNOMITRIUM EROSA*, *Cesia erosa*; *Carr et Pear.* Monocious, loosely caespitose, pale olive green, rhizomatous, creeping, sparingly branched, filiform, fertile stems erect, clavate, leaves very closely imbricate, appressed, erect, ovate or roundish-ovate, entire retuse or slightly notched, margin hyaline, irregularly erose, crenulate; cells minute, guttulate; bracts broadly ovate to cordate-ovate, bidentate, sinus acute, inner bracts 3-lobate, dentate. Pl. xii.

Mount Wellington, *R.A.B.*

For interesting observations on this plant and other six new species, see Messrs. Carrington and Pearson's communication in current proceedings of Roy. Soc. Tasmania.

It appears that the generic name *Cesia* has been taken from "Musci Scandinavica" by *Carr et Pear*, but as the Hookerian or Mittenian nomenclature prevails in works treating of Tasmanian *Hepaticæ*, *Cesia erosa* is here placed as *Gymnomitrium erosa*.

17. ISOTACHIS, *Mitten*.

Leaves and Stipules nearly equal.

Stem erect, branching with innovations almost trifarious. Leaves almost trifarious, vertical, imbricating, conduplicate, serrulate. Stipules nearly as large. Fruit terminal. Involutural leaves, inner minute, outer like the cauline. Perianth erect, tubular, fleshy, rigid; mouth contracted, toothed.

A Southern genus, of which its author says it may be recognised by its evenly arranged leaves and stipules, the latter so closely resembling leaves that the leaves may be almost called trifarious. It resembles *Sendtnera* in habit, but differs in the form of the perianth and free calyptra.

1. I. SUBTRIFIDA, *Mitten*, Fl. N.Z. p. 149. *Jungermannia subtrifida*, *Hook. f. and Tayl. Lond. Journ. Bot.*, 1844, p. 579. G. L. and N. Syn. Hep. p. 681. Fl. Tasm. t. 179, f. 7. Stem lin. high, slender, simple; tips decurved. Leaves pale brown, upper rosy, loosely imbricate, secund, erecto-patent, ovate, conduplicate, 2-3 fid.; teeth and dorsal margin entire; ventral entire or toothed. Stipules similar, smaller. Pl. xviii.

Tufts rather loose, pale brown. Leaves loosely imbricated below, more closely towards the thickened summits of the stems, very tumid, the lower usually bifid, the upper trifid, the segments short, lanceolate, subapiculate. *Lond. J. Bot.*, as above.

Tasmania, *Lawrence*, (New Zealand.)

2. I. GUNNIANA, *Mitten*. BROWN, stems erect, proliferously branched, tufty, 1 or 2in. high. Leaves divaricate, sub-vertical, cordate, deeply notched. Perianth cylindrical, fleshy, rough, apex white, diaphanous. Pl. iii. f. 3. Pl. xviii.

Very nearly allied to *J. madida* in size, colour, and habit, but with wider and less deeply notched leaves, which are also more distant and divaricate. Fl. Tasm. 232, p. 179. f. 8.

Arthur's Lakes, *Gunn, Archer.* (New Zealand.)
Summit of Mount Wellington, *R.A.B.*

3. I. INTORTIFOLIA (*Mitten*). *Jungermannia intortifolia*, *Hook, f. and Tayl.* Crypt. Antarct., p. 38, Pl. 64, f. 1. Stems $1\frac{1}{2}$ to 2 in. high, erect, flaccid, sparingly branched. Leaves purplish, spreading, imbricate, flaccid, cellular, very concave, ventricose, amplexicaul, orbicular, oblong, unequally, 2-4 fid, rarely entire; segments acuminate, incurved, toothed. Stipules imbricate, large, orbicular, very concave, emarginate, 2-fid or toothed-membranous. Pl. xviii.

On rocks, rivulet near Cummings' Head, Western Mountains, *Archer.* (New Zealand, Campbell's Island.)

18. SCAPANIA, *Lindenberg.*

Leaves complicate, stipules 0.

Stems erect or ascending. Leaves vertical, distichous, concave or complicate, 2-lobed. Stipules 0. Fruit terminal. Involucral leaves 2, larger than the cauline. Perianth compressed parallel to the direction of the leaves, mouth entire or ciliated. Capsule on a slender fruitstalk, ovoid; elaters with 2 spiral fibres. Antheridia in the forks of 2-lobed perigonal leaves.

A small genus, native of the north and south temperate zones, rare in the tropics. *Hook, Handbook. Fl. N.Z., p. 511.*

1. S. OBTUSIFOLIA, *Jungermannia obtusifolia*, *Hook. Brit. Jung. t. 26. J. domestica, Gottsche, Plantæ Muellereanæ.* Growing in dense tufts of a pleasant green colour, two or three inches in diameter, firmly attached by thick roots. Stems nearly erect, seldom much above a quarter of an inch in length, and unbranched. Leaves in two opposite rows, closely overlapping so as to conceal the stem, and divided half-way down into two unequal lobes, both rounded at the apex, and smooth at the edges. Calyx large, contracted, and toothed at the mouth. Capsule egg-shaped. *Cook's Brit. Hep., p. 7. Pl. xix.*

These specimens (Tasmanian) appear to agree in

every respect with British examples, only that the stems are a little longer, and perianth a little shorter. Fl. Tasm. ii., 233.

Rivulet near Cummings' Head, Western Mountains, Archer. Grass Tree Hill, Oldfield. (Great Britain).

2. *S. DENSIFOLIA*, Nees. *S. vertebralis*, Gottsche, Fl. Antarct., 153. Stems 3-4in. high, erect, rarely branched. Leaves olive-green or brown, distichous, crowded, vertical, spreading, 2-fariously imbricate, 2-fid ciliated; lobes incurved, twisted. Syn. Hep. 73. Hook. Musc. Exot. t. 36. Pl. xix.

A most beautiful plant. There appears to be no difference, excepting the paler colour, to distinguish *S. vertebralis* from the present, and the perianth is, as in other species of the genus, flattened, and at the apex truncate.

Tasmania, Gunn. (Lord Auckland's Group, on trees, rare.)

19. GOTTSCHIA, Nees.

Fruit terminal.

Leaves with adherent lobe.

Stems erect or sub-erect from a creeping^v rhizome, simple, rarely branched, very stout, fleshy and cellular. Leaves vertical, very large, distichous, cellular and fleshy, 2-lobed, complicate, serrate or pinnatifid, lobes sometimes lamellate. Stipules rarely absent. Fruit terminal in the hollowed apex of the stem. Involucre tubular, with a lacerate mouth, or formed of imbricating stipular leaves, free or connate with the tumid apex of the stem, together forming the perianth. Calyptra ovate. Capsule on a stout fruit-stalk, oblong or ovoid; elaters with 2 spiral filaments. Antheridia in ventricose, imbricate, perigonial leaves similar to the cauline.

A magnificent genus, abundant in the damp gullies of Tasmanian mountains, also in New Zealand.

Stipules 0.

1. *G. PINNATIFOLIA*, Nees. Fl. Tasm., p. 233. Fl. N.Z. ii., 149. Stems 2-3in. high. Leaves dull green, closely imbricate, obliquely ovate-acuminate or ovate-lanceolate, irregularly toothed and ciliate; dorsal lobe nearly as long as, but narrower than, the ventral; involucre toothed. Stipule 0. Perianth cylindrical-oblong; mouth 5-lobed; lobes toothed. Syn. Hep. 22.

Hook. Musc. Exot., t. 114; Fl. Antarct. 147, t. 63, f. 1. *G. ciliigera*, Hook. f. and Tayl. in Lond. Journ. Bot. iii., 376. Pl. xx.

In a rivulet near the Acheron River, with *Chiloscyphus conjugatus*, Gunn. (New Zealand, Lord Auckland's Group.)

Leaves $\frac{5}{8}$ stipulate.

2. *G. CILIATA*, Mitten. Fl. N.Z. ii., 151, t. 101, f. 4. Stems 2-3 in. high, glabrous. Leaves purplish-green, closely imbricate, very broadly ovate, ciliated all round with hair-like cilia; lobes nearly equal. Stipules 2-4 fid., lobes rounded, long, ciliated. Pl. xx.

In the same locality, and with the preceding species, Gunn. (New Zealand). Mount Wellington, R.A.B.

Leaves lamellate, stipulate.

3. *G. LEHMANNIANA*, Lindb. Stems 2-3 in. high. Leaves ovate-oblong, crested with short lamellæ, serrate, ventral lobe ovate-lanceolate, dorsal as long. Stipules ovate, 2-4 fid.; segments ciliate, furnished at the base with pinnatifid leaflets. Perianth terminal; involucreal leaves, connate, sub-pinnatifid at the apex, acute, ciliate, serrate. Syn. Hep. 20. Mont. Voy. au Pôle Sud. 276, t. 16, f. 1. *G. Hombroniana*, Mont.

Dense forest near Franklin River, near the Acheron River, and in a rivulet near the same, with the preceding species, Gunn. Back River Gully and elsewhere, common, Oldfield. Cheshunt, Archer. Gullies, Mount Wellington, abundant, Rodway, R.A.B.

20. SENDTNERA, Endlicher.

Leaves incubous, without lobe.

Fruit terminal.

Stems erect or inclined, tufted, pinnately branched; branches often recurved, attenuated. Leaves obscurely distichous, incubous, closely imbricate, 2-5 cleft, segments entire. Fruit terminal on long branches. Involucreal leaves numerous, incised, connate with the perianth. Perianth tubular, deeply cleft, membranous at the base. Calyptra chartaceous. Capsule globose on a short fruitstalk; elaters free, with 2 spiral fibres. Antheridia in the axils of tumid perigonal leaves, on proper branches.

1. *S. JUNIPERINA*, Nees. Fl. Tasm. ii., 234; Fl. N.Z. ii., 153. Stems 3-5 in. long, sub-erect, slender. Leaves pale brown, and stipules oblong, 2-fid, with an obtuse

sinus; segments lanceolate, acuminate, straight or slightly diverging. Syn. Hep. 239. Hook. Brit. Jung. t. 4, and Suppl. t. 1. Pl. xxi.

This plant, like those from New Zealand, corresponds nearly with the species from Great Britain.

A few stems picked out of other *Hepaticæ* Gunn. In bogs summit of Mount Wellington, *Oldfield*. (New Zealand, India, Europe).

2. *S. SCOLOPENDRA*, *Nees*. See genus *Leperoma*. Pl. xxi.
3. *S. FLAGGELIFERA*, *Nees*. See genus *Mastigophora*. Pl. xxi.

21. LEPEROMA, *Mitten*.

This name is proposed by Mitten for *Sendtnera scolopendra*, also for *S. ochroleuca* and *S. attenuata* of the New Zealand species. Leaves distinct, incubous, without an inferior lesser lobe. Perianth leafy. Fruit lateral.

The leaves and stipules deeply cleft; calyptra adnate with the involucreal leaves; fruit near the top of the stem.

1. *L. SCOLOPENDRA*, *Sendtnera scolopendra*, *Nees*. Hook. Musc. Exot. t. 40. Fl. N.Z. ii., 153. Stems 3-5in. long, erect, pinnate, branches deflexed, attenuated to the tips, flageliform, naked, often rooting. Leaves and stipules closely imbricate, scarious, rigid, oblong, 2-fid; segments diverging, again 2-fid, acuminate, diaphanous. Perianth in the axils of lateral branches, obovate, 4-fid, covered with imbricating leaves. Hook. Handbook, Fl. N.Z., 528. Pl. xxi.

Summit of Mount Wellington, *Oldfield*, *R.A.B.* (New Zealand, Lord Auckland's Group, Campbell's Island.)

22. LEPIDOZIA, *Nees*.

Fruit lateral.

Leaves and stipules deeply cleft; perianth near base of stem, 3 gonous. Stems creeping, often very minute and slender, throwing out rootlets from the ventral surface. Leaves incubous, obscurely distichous, 4-toothed or 4-cleft. Stipules present. Fruit lateral. Involucreal leaves numerous, short, broad, toothed. Perianth near base of stem, elongate, 3 angled, the faces hollow; mouth toothed. Calyptra mem-

branous. Capsule or slender fruitstalk, globose; elaters with 2 spiral fibres. Antheridia solitary in the bases of conduplicate 2-3 cleft perigonal leaves.

A large genus of minute leaved plants, often themselves minute and almost microscopic. They are exquisitely beautiful objects over dark ground illumination in the microscope.

I. Leaves 3-5 fid, not toothed nor serrate.

*Stems flexuose, wiry, 1-4 in. long, much pinnately or bi-pinnately branched; branches decurved, attenuated.

1. *L. microphylla*.
2. *L. procera*.
3. *L. quadrifida*.
4. *L. capilligera*.
5. *L. prænitens*.
6. *L. Gottscheana*.
7. *L. lævifolia*.
8. *L. pendulina*.
9. *L. centipes*.
10. *L. glaucophylla*.

**Stems usually less than lin. long, capillary, vaguely branched.

11. *L. Lindenbergii*.
12. *L. capillaris*.
13. *L. cupressina*.
14. *L. patentissima*.

II. Leaves 3-5 fid and also toothed.

15. *L. tenax*,
16. *L. ulothrix*.

1. *L. MICROPHYLLA*, *Lindb. Jungermannia microphylla*, Hook. Musc. Exot. t. 80. Fl. N.Z. ii. 85. Stems 1-2in. long, pinnately branched, branches pendulous with capillary tips. Leaves minute, distant, appressed, palmately 4-partite; involucre oblong-ovate, 2-4 fid. Stipules quadrate, flat, deeply 4-fid. Perianth cylindrical, attenuate, incurved, obscurely toothed. Syn. Hep. 202. Pl. xxii.

Acheron River, *Gunn*. (New Zealand.)

2. *L. PROCERA*, *Mitten*. Stems erect, simply pinnate; branches attenuate, decurved; leaves minute, erectopatient, remote, ovate-quadrate, quadrifid; laciniae acute; stipules smaller, sub-quadrate, quadrifid.

Pale brown, stem 6 in. long, slender, simple. Branches slender, attenuate, areolation small.

Similar in appearance to some states of *L. microphylla*, but differing in the narrow outline of its stems (owing to the shortness of the branches), and the leaves are more deeply quadrifid with more acute laciniaë, which are not collected together at their apices, but stand out from each other. Fl. Tasm. ii., 251, t. 180. f. 1. Pl. xxii.

Tasmania, *Gunn.* Mount Wellington, amongst *Plagiochila retrospectans* and *L. Ulothrix*, *Oldfield.*

3. *L. QUADRIFIDA*, *Lindb.*; *Gottsche.* Sp. Hep. Lepidozia. p. 23. t. 4.; G. L. and N. Syn. Hep. p. 203. Pl. xxii.

St. Patrick's River, *Gunn*, Plains rivulet, *R.A.B.*

4. *L. CAPILLIGERA*, *Lindb.* Fl. N.Z. ii., 145. Stems lin. long, erect, simply pinnate; branches with capillary tips. Leaves olive-brown, sub-imbricate, $\frac{1}{2}$ vertical or horizontal, and stipules, obovate-quadrangle or cuneate, 4-fid to the middle, lobes divaricate, subulate. *L. tetrapila*, *Tayl.* in Lond. Journ. Bot. 1846. 370; Syn. Hep. 716. Pl. xxii.

Tasmania, *Labillardiere*, (H 6. Mont.) The Falls, *Archer.* Castle Forbes Bay Rivulet, *Oldfield.* Mount Wellington, *Mossman.* (New Zealand.)

5. *L. PRÆNITENS*, *Lehm.* and *Lindb.*, Fl. N.Z. ii., 145. Stems procumbent, alternately 2-pinnate. Leaves sub-imbricate, $\frac{1}{2}$ vertical, obovate-cuneate, 4-fid, segments lanceolate. Stipules patent, transversely quadrangle, 4-partite; lobes divaricate. Perianth sub-sessile, curved; mouth sub. 4-toothed. Syn. Hep. 206. Pl. xxiii.

Brown's River, *Oldfield*, (New Zealand, Lord Auckland's Group.)

6. *L. GOTTSCHIANA*, *Lindb.* Fl. N.Z. ii., 145. Stems procumbent, irregularly sub-pinnately branched. Leaves approximate, sub-horizontal, flat, obcuneate or quadrangle, 4-fid, lobes subulate. Stipules remote, 4-partite. Perianth as in *L. prænitens*. Syn. Hep. 206.

This and the two preceding seem not essentially different. Hook. Handbook. N.Z. Pl. 521.

Tasmania, *Labillardiere*, amongst *Sarcomitrium cochleatum*. St. Patrick's River, *Gunn.* On dead wood, Grass Tree Hill, *Oldfield.*

7. *L. LÆVIFOLIA*, *Hook. f. and Tayl.* Fl. Antaret. 157, Fl. N.Z. ii., 146. Stems 1—2in. long, excessively pinnately branched; branches deflexed. Leaves yellow or olive-brown, sub-vertical, rather close-set, sub-

imbricate on the branches, ovate-cordate, 3-5 fid; lobes flat or incurved; involucre small. Stipules distant, spreading, ovate, cordate or orbicular, 4-fid. Perianth as in *L. prænitens*. Syn. Hep. 208. Pl. xxiii.

Back River Gully, with fruit, *Oldfield*; Cheshunt, *Archer*; Gullies, Mount Wellington, *R.A.B.*

8. *L. PENDULINA*, *Lindb.* Stems 2-3in. long, erect, 2-pinnate; branches pendulous, fascicled; tips capillary. Leaves imbricate, sub-verticle, obliquely secund; stipules orbicular-ovate, convex, deeply 4-fid; segments lanceolate, conniving, somewhat waved. Syn. Hep. 208; *Lindb.* and *G.* Sp. Hep. 49. t. 7. *Jungermannia pendulina*, *Hook.* Musc. Exot. t. 60. Pl. xxiii.

North-West Bay, Gully, and Castle Forbes Bay Rivulet, *Oldfield*, *Archer*.

From the Ploughed Fields, Mount Wellington, *R.A.B.* (New Zealand.)

Fig. 1, *L. pendulina*, nat. size. Fig. 2, portion of stem with leaves. Fig. 3, leaf. Fig. 4. stipule. Fig. 5, extremity of a leaf, to show the reticulation. Musc. Exot.

9. *L. CENTIPES*, *Tayl.*; *Lindb.* and *Gottsche.* Sp. Hep. *Lepidozia*, p. 29, t. 5; *G. L.* and *N.* Syn. Hep. p. 204. Very minute; light green. Pl. xxiv.

Tasmania, *Spence.* On damp ground, Kermantie Rivulet, South Huon, *Oldfield*, near Hobart. *R.A.B.*

10. *L. GLAUCOPHYLLA*, *Tayl.* Stems procumbent, bipinnate; branches attenuated on stems 1, 2, or 3in. long. Leaves approximate, $\frac{1}{2}$ vertical, widely ovate-quadrate, quadrifid, lacinæ acuminate; stipules patulate, ovate-quadrate, quadrifid. *Tayl.* Lond. Journ. Bot. 1844. 580. Syn. Hep. p. 207. Pl. xxiv.

Pale glaucous green; leaves divergent, lacinæ short, acuminate; areolation minute, nearly opaque.

Readily distinguished from all allied species by its glaucous white colour. Fl. Tasm. ii., p. 231.

Tasmania, *Gunn.* Back River Gully, New Norfolk, Castle Forbes Rivulet, South Huon, *Oldfield*. Rivulet at Cheshunt, and amongst *Sphagna*, Western Mountains, *Archer*. Plains Rivulet, *R.A.B.*

11. *L. LINDENBERGII*, *Gottsche.* Stems creeping, 1-2 pinnately branched; branches crowded, spreading. Leaves pale yellow, green, distant, distichous, sub-vertical, spreading, obovate-quadrate; segments capillary, articulate, straight and incurved; involucre

unequally divided. Stipules orbicular-ovate, 3-5 partite. Perianth cylindric, elongate; mouth contracted, ciliate. Fl. N.Z. ii., 146; Syn. Hep. 213. G. L. and N. Sp. Hep. Lepidozia, 63. t. 12; Lindb. and G. Sp. Hep. 66. t. 11. *L. tetradactyla*, Fl. Antart. 158.

A few slender stems creeping amongst *Chiloscyphus conjugatus*, Acheron River, Gunn. St. Crispin's Well, Mount Wellington, R.A.B. (New Zealand.)

- L. CAPILLARIS, Lindb. Fl. N.Z. ii., 146. Stems $\frac{1}{2}$ in. long, creeping, capillary, pinnately branched or decomposed; branches diverging. Leaves vertical, sub-imbricate, obovate-quadrate; minute stipules 3-4 partite; segments lanceolate, subulate, incurved, obtuse; involueral shortly incised, ciliate, margins toothed. Perianth with the mouth ciliate. Hook. Handbook Fl. N.Z. 522; Syn. Hep. 212. *L. hippuroides*, Hook. F. and Tayl. Fl. Antart. 159. t. 65. f. 7. *I. nemoides*, Tayl. in Hook. Lond. Journ. Bot. 1845, p. 84. Pl. xxiv.

Bare ground in bogs; Brown's River, *Oldfield*. Wellington Falls, R.A.B. (New Zealand, Lord Auckland's Group, Jamaica, South Africa.)

13. L. CUPRESSINA, Lindb. Forming dense cream-coloured cushions on ledges of rocks and trees. Stems distinctly and irregularly branched, or densely pinnately branched. Leaves cordate, quadrifid, with the lower tooth bent inwards. Stipules 4-toothed. Cook's Brit. Hep. 16. Pl. xxiv.

Tasmania, Dumont d'Urville, Herb. Montagne and Nees. (Ireland.)

14. L. PATENTISSIMA. — Stem minute, short, slender, $\frac{1}{2}$ in. long, creeping, tufted, sub-pinnately branched; branches short. Leaves olive-green, imbricate, rather close-set, obliquely spreading, cellular, obovate-quadrate; narrowed at the base, 3-5 fid; segments shortly ovate-subulate, straight or incurved. Stipules similar, minute. Hook. Handbook Fl. N.Z., 522; Hook. f. and Tayl., Fl. Antart. i., 158 t. 65 f. t., Syn. Hep. 204. Pl. xxv.

Gullies, Mount Wellington, R.A.B. (Lord Auckland's Group.)

15. L. TENAX, Lindb. Stems pinnately compound or decomposed; branches incurved; tips convolute. Leaves imbricate, vertical, ovate, concave, cauline appressed, 8-partite, sides lacerate and ciliate, those of the branches spreading, 3-4 fid; segments subulate. Stipules ovate, flat, 4 or 5 parted, ciliate and lacerate

at the base. Fl. Antarct., 158; Greville in Annals of New York Lyceum, i., 277, t. 23. Syn. Hep. 212; Hook. Handbook Fl. N.Z. 523.

With *Symphogyna flabellata* and *Chiloscyphus laxus*, St. Patrick's River, *Gunn*. Brown's River, Castle Forbes Bay Rivulet. South Huon, *Oldfield*. Gully, Mount Wellington, *R.A.B.* (Lord Auckland's Group, Australia.)

16. *L. ULOTHRIX*, *L. albula*, Hook. f. and Tayl. Fl. Antarct. 47, p. 65, f. 6. Stems $\frac{1}{2}$ -lin. long, procumbent, sub-pinnately branched; branches decurved, narrowed to the tips. Leaves yellow or greenish-white, pellucid, densely imbricate, very broad, amplexical, spreading, very concave, cellular, obliquely-oblong, 4-fid, and deeply incised all round; dorsal margin dilated; laciniaë entire or 2-fid, incurved. Stipules large, orbicular, concave, irregularly deeply 6-8 toothed. Hook. Handbook Fl. N.Z. 523; Syn. Hep. 211. Pl. xxv.

Tasmania, *Fraser*. North-West Bay Gully, and about Springs, Mount Wellington, *Oldfield*. Oven's Creek, *Archer*. Gullies, Mount Wellington, abundant, *R.A.B.* (Australia, Lord Auckland's Group.)

23. MASTIGOBRYUM, *Nees*.

Without an inferior lesser lobe.

Perianth leafy, fruit lateral.

Leaves and Stipules]entire, or with apices truncate, dentate; perianth in the lower part of the stem; 3-gonous.

Stems creeping and rooting or ascending, large, sparingly branched, giving off numerous filiform leafless shoots. Leaves distichous, incubous, usually 3-fid at the apex. Stipules toothed, often connate with the leaves above them. Fruit (and antheridia) terminal, on short proper branches, arising from the bracts of the stipules. Involucral leaves small, narrow, incised at the apex. Perianth elongate, 3-angular; mouth 3-toothed. Calyptra membranous. Capsule globose, on a slender fruit-stalk; elaters with 2 spiral fibres. Antheridia 2, in the axil of each perigonial leaf.

A tropical and sub-tropical genus, rare in Europe and North America, most abundant in Australasia. The species are often broad and flat, some resembling *Lophocolea* in general habit, but the stipules are connate with the leaves above (not below) them.

1. *M. DIVARICUM*, *Gottsche*, L. and N. Sp. Hep. p. 19, n. 14, t. v. f. 1; Syn. Hep. 219, v. 16; var *Muellire*, *Gottsche* in Linn. t. t. 28, p. 556, n. 23. Frag. Phyt. Austral. Fv. m. p. 60.

Mount Wellington, Tasmania, (Australia.)

Stipules quite free from the leaves, leaves 2-dentate.

2. *M. COLENZOANUM*, *Mitten*. Fl. N.Z. p. 147, plate 100, f. 3. Small, stem lin. long, procumbent, dichotomous, stoloniferous. Leaves pale green, membranous, spreading, flat, imbricate, oblong, 2-dentate, smaller tooth on the ventral side; sinus acute; dorsal margin arched, ventral straight. Stipules appressed, minute, 3-toothed Pl. xxvi.

Tasmania, *Oldfield*, (New Zealand, Australia.)

Stipules quite free from the leaves, leaves 3-dentate.

3. *M. MONILINERVE*, *Nees*. Fl. N.Z. ii., 148. Stems procumbent, dichotomous. Leaves approximate, $\frac{1}{2}$ vertical, spreading, convex, obliquely oblong, 3-dentate; ventral margin with a band of large translucent cells. Stipules close-set, orbicular-ovate, crenulate. Perianth plicate above; mouth toothed. Syn. Hep. 223. Pl. xxvi.

- M. ECHINATUM*, *Gottsche*, L. and N. Syn. Hep. 218.

Tasmania, *Labillardiere*. The Snug, Huon, with *Lophocolea echinella*, *Oldfield*. (New Zealand, Australia.)

Stipules connate on both sides with the leaves above them, apex crenate.

4. *M. INVOLUTUM*, *Lindb.* Fl. N.Z. ii., 148. Large, stems 2-3in. long, forked; branches dense. Leaves densely imbricate, diverging and deflexed, obliquely oblong, concave; apex 3-dentate, incurved, or involute. Stipules sub-orbicular, repand; apex crenate, reflexed, connate with the leaves above them. Syn. Hep. 221. Montagne in Voy. au Pôle Sud. t. 18. f. 2.

Herpeteum involutum, *Montagne*, Cent. IV. N. 30.

Kangaroo Bottom, *Hooker*. Goat Hills, *Oldfield*. (New Zealand, Lord Auckland's Group.)

Stipules connate on both sides with the leaves above them, dentate or multifid.

5. *M. NOVÆ HOLLANDIÆ*, *Nees*. Fl. N.Z. ii., 148. Stems 2-3in. long, procumbent, dichotomous; branches equal, often recurved. Leaves imbricate, divergent, flat or convex, ovate-oblong, subfalcate, unequally serrulate, erose or dentate at the apex; involucrel appressed, inciso-serrate. Stipules close set, orbicular-quadrangle, dentate or multifid, usually connate with the leaves

above them. Perianth cylindric-ovate, narrowed upwards and plaited; mouth dentate. Syn. Hep. 221 and 717.

M. adnexum, *Lehm.* and *Lindb.* Mont. Voy. au Pôle Sud, 243. Pl. xxvi.

Var. α , Tasmania, *Fraser*.

Var. γ , St. Patrick's River, and near Yorktown, *Gunn*. Dense tufts on rotten wood; Goat Hills, New Norfolk; and Springs, Mount Wellington, Brown's River Gully, *Oldfield*. Cheshunt, *Archer*. Mount Wellington, *R.A.B.*

24. RADULA, *Nees*.

Leaves incubous, with inferior lobule.

Lobule plane, fruit terminal.

No Stipules.

Stems erect or creeping, pinnately branched. Leaves distichous, incubous, 2-lobed; ventral lobe small, inflexed, rooting at the base. Stipules 0. Inflorescence monoicous. Fruit in the fork or apex of short branches. Involucral leaves 2, 2-lobed. Perianth terete or compressed; mouth dilated, calyptra pyriform, persistent, bursting below the apex. Capsule on a short fruitstalk, ovoid; elators with 2 spiral fibres; spores large. Antheridia in the inflated bases of perigonial leaves.

1. *R. BUCCINIFERA*, *Hook. f.* and *Tayl.* Fl. N.Z. ii., 154.

Stems lin. long, prostrate, pinnate. Leaves yellow-green or brown, sub-imbricate, spreading, rounded at the apex, upper lobe obovate-orbicular, convex, its apex incurved, lower minute, trapezoid, appressed. Perianth at length axillary, very long, sub-cylindric, compressed above, mouth dilated, quite entire. Syn. Hep. 261.

St. Patrick's River, *Gunn*. On rocks, Back River Creek and Brown's River, *Oldfield*. Rivulet at Cheshunt, *Archer*. Tasmania, *Stuart*. Ulverstone, N.W. Coast, *Miss Lodder*. Rivulet, Mount Wellington, *R.A.B.*

2. *R. ANEURISMALIS*, *Hook. f.* and *Tayl.* Stems slender, vaguely branched; branches short, slender, subsecund, leaves lax, erecto-patent, rotund, very concave, entire, inferior lobe tumid, apex incurved.

Creeping, scattered, pale olive-brown. Stems scarcely $\frac{1}{2}$ in. long, branches very slender, their leaves minute. Leaves cup-shaped, with an obtuse angle at the point most distant from the stem. The lobule has a tumid

base, whilst its top lies flat on the inner part of the leaf, and has a single angle pointing outwards. The perigonia occur in the course of the shoots, and are remarkably long and large in proportion to the size of the stems. The present is the minutest of the *Radula* yet observed, and is readily distinguished by its peculiar perigonia.—Dr. Taylor.

It is just possible that it is the male plant of *R. Novæ Hollandiæ*. Fl. Tasm. p. 235.

On *Metzgeria furcata*, *Hooker*.

3. *R. NOVÆ HOLLANDIÆ*, *Hampe*; G. L. and N. Syn. Hep., p. 254.

Tasmania, *Herb. Stuart, Gottsche (Plantæ Mullerianæ)*, Australia.

4. *R. PHYSOLOBA*, *Mont*, Fl. N.Z. ii., 154. Stems procumbent, rigid, flexuous, much pinnately branched. Leaves yellow-green or brown, sub-vertical, orbicular, convex, quite entire; apex inflexed; lobule large, inflated below the apex, retuse or emarginate. Perianth terminal or axillary, long, cochleariform, truncate. Syn. Hep. 254. *Mont. Voy. au Pôle Sud*. 256 t. 17 f. 4. *L. aquilegia*, *Hook. f. and Tayl. in Lond. Jour. Bot.*, 1846, 291. Pl. xxvi.

Near Cumming's Head, Western Mountains, *Archer*. (New Zealand, Lord Auckland's Group.)

25. LEJEUNIA, *Libert*.

Incubous leaves with inferior lesser lobe.

Lobule plane, fruit terminal.

Perianth obovate, 3-6 plicate, mouth a tubular beak, *Mitten*.

Stems prostrate or creeping. Leaves distichous, incubous. Stipules usually present. Inflorescence diœcious. Fruit lateral or terminal on proper branches. Involucral leaves 2, 2-lobed. Perianth ovoid or obovoid, terete or angled; angles winged or crested; mouth 3-4 lobed. Calyptra obovoid, persistent, bursting below the apex. Capsule on short fruitstalk, globose, pale, 4-cleft halfway; elaters adhering to the valves, erect, upper end truncate with 1 spiral fibre. Antheridia as in *Frullania*, on proper branches.

A very large tropical and temperate genus, of which 236 species were published in the "Synopsis Hepaticarum" in 1844, and many have been added since. *Hook. Handbook N. 2 Fl.* 531.

The stipules are sometimes absent. *Mitten*.

Stipules rather large, conspicuous.

1. *L. TUMIDA*, *Mitten*, Fl. N.Z. p. 157. Pl. 103, f. 3. Stems very slender, $\frac{1}{4}$ to $\frac{1}{2}$ in. long, much branched. Leaves bright green, loosely imbricate, cells pellucid, very convex, spreading, rather horizontal, obliquely ovate-oblong, rounded at the apex, quite entire; lobule small, inflexed, inflated; involucre with a longer obtuse lobule. Stipules orbicular, acutely 2-fid. Perianth obovoid, tumid, retuse, inflated and obscurely 5-angled at the summit. Pl. xxvii.

Tasmania, *Gunn*. Gullies, Mount Wellington, clothing the lesser twigs of trees with a mantle of green, *R.A.B. Launceston*, *Miss Oakden*. (New Zealand, Australia).

Stipules minute.

2. *L. RUFESCENS*, *Lindb.* Syn. Hep. 366; *L. implexicaulis*, *Hook f. Tayl.* Fl. Antarct. 165; Syn. Hep. 376; *L. mimosa* and *L. albo-virens*, *Hook f. and Tayl.* Fl. Antarct. 166. t. 66. f. 4; Syn. Hep. 377 and 387; Fl. N.Z. ii., 158. *L. implexicaulis*. Stems $\frac{1}{4}$ to $\frac{3}{4}$ in. long, creeping, branched. Leaves olive-green, cellular, imbricate, spreading or sub-erect, oblong-obovate, orbicular-ovate or ovate, convex; apex incurved, obtuse sub-acute or truncate; lobule small, involute. Stipules usually narrower than the branch, more or less orbicular, acutely 2-fid. Perianth lateral, sessile, compressed, with one keel on the dorsal and two on the ventral side. Pl. xxvii. *L. implexicaulis*, *mimosa*, *albo-virens*, and *primordialis*, *Lond. Journ. Bot.* 1844, 397, 398, and 1845, 92 f.

Probably a very common Southern species (of which *L. primordialis* is an exceedingly small variety), and the representative of the European *L. serpyllifolia*. *Hook. Handbook.* Fl. N.Z. 533 N.

Creeping over *Hypnum extenuatum*, St. Patrick's River, *Gunn*. On rocks, north side of cataract, Launceston, *Archer*. (New Zealand, Lord Auckland's Group, Campbell's Island, Fuegia.)

Stipules half as large as the leaves.

3. *L. GUNNIANA*, *Mitten*. Stem creeping, vaguely branched. Leaves imbricate, oblong-ovate, obtuse, lobule small, apex involute, minutely bidentate. Stipules large, orbicular, bidentate, sinus acute. Lobule of the involucre lanceolate, acute, stipule oblong-obovate. Perianth oblong, retuse, compressed, acute pentagonal; upper angles crenulate with the swollen cells. Pl. xxvii.

Dirty brown. Stem $\frac{1}{2}$ in. long, tufty, areolation of the leaves, large, pellucid.

A small species, chiefly remarkable for its lax areolation, and for the minutely crenulate upper edges of the carinæ of its perianth. In size it resembles *L. rufescens*, but is much more flaccid, and all the specimens are of a dirty brownish colour.

Tasmania, *Gunn*; Brown's River, *Oldfield*.

Nearly allied to *L. tumida*, if not identical. *Hook*.

4. *L. TASMANICA*, *Gottsche*. Stems creeping, much branched. Leaves imbricate, ovate, obtuse, entire; lobule rather large, inflated, apex immarginate, truncate. Stipules 1-3rd as large as the leaves, ovate-cordate, erect, distant or near to the leaves, convex, bifid to about the middle, segments lanceolate. *Gottsche*, "Plantæ Mullerianæ."

Intermediate between *L. tabularis* and *L. serpyllifolia*, nearest to the former, smaller stature, and differing in respect of smaller stipules to the leaves.

This appears to be nearly allied to *L. tumida*, and may even be identical with it. Fl. Tasm. ii., 236.

Creeping amongst *Radula buccinata*, *Stuart*.

Lower lobe of leaf scarcely distinct from the larger.

5. *L. SERPYLLIFOLIA*, *Libert*, Syn. Hep. 374, of a compact habit, forming pale yellowish-green patches. Stems from $\frac{1}{2}$ to $\frac{3}{4}$ in. in length, slender, irregularly branched. Leaves overlapping, arranged in two rows. The lower lobe resembling an overlapping base to the larger lobe, and is scarcely distinct from it. Stipules roundish, deeply notched at the apex. Calyx pear shaped, with five longitudinal angles; the mouth is small and protruding; capsule, spherical and white. *Cook*. Brit. Hep. 20. Pl. xxvii.

Cheshunt, or trees, *Archer*.

These specimens agree in all respects with European examples of the species, and possess the same property of staining the paper on which they are preserved of a dull leaden colour. Fl. Tasm. 236, n.

Stipule at the base of every leaf.

6. *L. LYRATIFOLIA*, *Hook. f.* and *Tayl.* Stems minute, scarcely 3 lines long, slender, procumbent, vaguely branched, branches few and irregular. Leaves lax, patent, sub-quadrate (harp-shaped), their outer margin recurved. Lobules oblong, involute; stipules bipartite, segments lanceolate, divaricate. Perigonia in

short terminal spikes. Perichætia of a pair of erect leaves with unequal acute segments, and an oblong bifid stipular one. Calyx exerted for half its length. Allied to *L. hamatifolia*, *Nees*; yet the acumination of one angle of the leaf is far shorter, and the leaves more patent and less imbricated. Pl. xxvii.

Patches of very pale brownish-olive. Lond. Jour. Bot. 1846, 393. Syn. Hep. 756. Fl. Tasm. ii., 236, p. 180, f. 4.

A minute species whose place is amongst those with a stipule at the base of every leaf, and generally with a few enlarged cells, giving their leaves a more or less regularly dotted appearance.

Tasmania, creeping over *Parmelia diatrypa*, *Hooker*.

7. *L. LATITANS*, *Hook. f.* and *Tayl.* Flor. N.Z. ii. 159. Stems minute, creeping, slender, 1-4th to 1-3rd in. long. Leaves pale green, distant, erecto-patent, ovate, acute, or acuminate; margins papillose; lobule ovate, involute, half the size of the leaf; involueral united with the obovate involueral stipule. Stipules minute, 2-fid; segments lanceolate, obtuse. Syn. Hep. 345. Fl. Antarct., 166.

Mount Wellington, *R.A.B.*

26. TRICHOCOLEA, *Nees*.

Leaves capillary, multifid.

Stems erect or inclined, tufted, much branched, very soft, white and woolly to appearance. Leaves incubous and distichous, but clothing the stem, deeply palmately divided, the lobes laciniated. Stipules present. Fruit in the forks of branches. Involueral leaves many, connate into a hairy tube, which is adnate with the calyptra, coriaceous, mouth truncate. Perianth 0. Capsule oblong, on a slender fruitstalk; elaters with 2 spiral fibres. Antheridia in the axils of leaves on the upper side of the stem.

A small genus of very beautiful *Hepaticæ*, with the leaves so much ciliate as to give the whole stem a woolly appearance. Hook. Handbbook Fl. N.Z. 527.

1. *T. TOMENTELLA*, *Nees*. Stems 2-5in. long, 3-pinnate. Leaves white, 2-partite; segments capillary, multifid; ventral lobe smaller, inclined forwards. Stipules subquadrate, 4-partite, capillaceo-multifid. Syn. Hep. 237. *T. mollissima*, Fl. Antarct. 161; Syn. Hep. 237; *T. tomentella*, γ *javanica*, Syn. Hep. 721. Pl. xxviii.

Growing in dense pale green patches, several feet in extent, stem from 2 to nearly 4 in. in length and nearly erect, and very much branched. Leaves divided into two unequal portions, each of which is divided and sub-divided in a compound manner into thread-like branching segments. Stipules cleft into a number of narrow lobes. Fruit arising from the forks of the principal divisions of the stem. There are no true perichætal leaves. The calyx widens towards the mouth and is covered on the outside with minute slightly branched hairs. Cook Brit. Hep. 17.

Forest near Macquarie Harbour, *Gunn*. Port Arthur, *Oldfield*. Ulverstone, *Miss Lodder*. Launceston, *Miss Oakden*. Wellington Falls, *Rodway*. *R.A.B.* (Australia, New Zealand, Lord Auckland's Group, Campbell's Island, India, Europe, America.)

27. MASTIGOPHORA, *Nees*.

Leaves incubous, with an inferior lesser lobe, lobule plane, fruit lateral, perianth contracted at the mouth, compressed plicate. Quite different from *Sendtnera* in its lateral fruit, perianth not overlaid, and free calyptra; the habit is more that of *Madotheca*. Mitten in Hook. Handbook Fl. N.Z. 754.

1. *M. FLAGGELLIFERA*, *Sendtnera flaggellifera*, *Nees*. Stems 2-3 in. long, erect, pinnately branched; branches attenuate, flaggelliform. Leaves greenish-brown, 2-farious, horizontal, unequally 2-fid; lobes conduplicate; dorsal larger, acute, often slightly toothed; ventral more lanceolate, entire or 2-fid. Stipules ovate, 2-partite, rarely 4-fid, toothed at the base. Syn. Hep. 242 Hook. Musc. Exot. t. 59. Fl. N.Z. ii., 153. Pl. xxi.

Tasmania, *Gunn*. Mount Wellington, *R.A.B.* (New Zealand.)

28. FRULLANIA, *Raddi*.

Fruit lateral, lobe inflated galeate. Perianth 3-6 plicate or terete, with a tubular beak, *Mitten*. Stems prostrate or creeping, flattened, usually purplish-brown. Leaves distichous, incubous, convex, quite entire, with a simple or rarely double lobule at or near the base, which is erect or appressed, club-shaped, lunate, trumpet-shaped, or inflated. Stipules sometimes rooting at the base, usually 2-fid.

Inflorescence diœcious. Fruit terminal on proper branches. Involucral leaves two or three, not auricled. Perianth ovoid or obovoid, terete or 3-4 angled; mouth contracted, tubular. Calyptra pyriform, persistent, bursting below the apex. Capsule on a very short fruitstalk, globose, 4-cleft half-way; elaters adhering to the valves, truncate, with one spiral fibre; spores large, irregular. Antheridia in the saccate bases of closely imbricate 2-lobed perigonal leaves. Pistillidia 2 or 4 in each perianth.

I. Lobule more or less falcate or acuminate.

* Stipules 2-fid.

1. *F. falciloba*.
2. *F. deplanata*.

** Stipules 2-fid, sub-dentate.

3. *F. clavata*.

*** Stipules 2-fid, dentate.

4. *F. monocera*.
5. *F. proboscidiophora*.
6. *F. Hampeana*.

II. Lobule clavate.

7. *F. congesta*.
8. *F. megalocarpa*.
9. *F. diploata*.

III. Lobule $\frac{1}{2}$ orbicular.

10. *F. reptans*.

Note.—No description of *F. Gaudichaudii* available.

1. *F. FALCILOBA*, *Hook. f. and Tayl.* Stems 1-2 inches long, branched. Leaves brown, ovate or orbicular-oblong, slightly incurved; lobule large, elongate, falcate; involucral 2-lobed; lobule much cut. Stipules orbicular-oblong, 2-dentate; involucral large, 2-fid, 1-dentate on each side. Perianth convex on the dorsal, and having a broad keel on the ventral face. *Hook. Handbook Fl. N.Z.*, 536. *Syn. Hep.* 423. *Pl.* xxviii.

Patches wide, reddish rusty brown. Stems 3in. long, alternately branched; the branches bearing calyces shorter and more tumid. Leaves convex, closely imbricated. Perigonia are short obtuse spikes, sometimes almost round.

The curved tubular tops of the lesser lobes reach below the inferior margin of the upper lobes, which is a very distinctive mark, coupled with the short perigonia. *Lond. Journ. Bot.* 1844, 581.

Tasmania, *Gunn.* Penguin, and moist rocky banks, Risdon, *Hooker.* Dense mats on the south side of rocks, Johnny's Creek, rocks by the seaside, South-

port, Kermandie Rivulet, and Mount Wellington, *Oldfield*. Jackey's Plain Creek, *Archer*; gathered also by *Stuart*. On rocks, Proctor's-road, Mount Nelson, Cascades Rivulet, and Springs, Mount Wellington, *Miss S. Gerard*, *A. J. Taylor*, *R.A.B.*

2. *F. DEPLANATA*, *Mitten*. Fl. N.Z. ii., 161, t. 104, f. 3. Stems lin. long, pinnate. Leaves red-brown, diverging, imbricate, orbicular-ovate or oblong; apex rounded, incurved; lobule large, falcate, recurved, acuminate; involucrel ovate, acute, entire or toothed, with a lanceolate toothed lobule. Stipules suborbicular, shortly 2-fid; involucrel elongate, laciniate. Perianth obovate, elongate, flattened at the top, retuse, mucronate, smooth. *Hook. Handbook Fl. N.Z. 536, Pl. xxviii.*

At the roots of trees, Brown's River Gully, and Johnny's Creek, *Oldfield*. Cheshunt, *Archer*. On trees, Mount Wellington, growing with *F. monocera*, from which it is at once distinguished by its flat, smooth perianth, *F. monocera* having a spiny one (*Pearson*), *R.A.B.* (New Zealand).

3. *F. CLAVATA*, *Hook. f. and Tayl.*, Lond. Journ. Bot., 1845-88, G. L. et. N. Syn. Hep. 428. Stems procumbent, vaguely subpinnately branched, branches thickened at the apices. Leaves imbricate, rotundo-oblong, convex, entire, inferior lobe large, galeate, acuminate, decurved. Stipules round, 2-fid, sub-dentate. Calyx almost immersed, obovate, biplicate, apex tubular; perichætical leaves toothed on the ventral margin.

Scarcely quarter of an inch long, pale green, sometimes brownish purple. Stipules large, their emargination shallow and rounded. Auricles large compared with the leaves. The calyx, rising little out of the perichæcium, is widest near the mouth, below which it is rather suddenly contracted. The lateral perichætical leaves have, besides a segment corresponding to the auricle of the leaf, an inner one which is lanceolate and dentate. Allied to *F. trinervis* L. et. L., but this is of a dark brown colour, has a more exerted three nerved calyx, the auricles are less acuminate, and the stipules more entire. *Tayl. in Fl. Tasm. n. p. 237.*

On *Nephroma cellulosa* Tasmania, *Herb. Tayl.*

4. *F. MONOCERA*, *Hook. f. et. Tayl.* Lond. Journ. Bot., 1845-89; Syn. Hep. 418. Stems entangled, prostrate, vaguely branched. Leaves oblong-ovate, roundish, plane, entire; inferior lobe galeate, deflexed spiniform.

Stipules ovate-acuminate, bifid, dentate. Perianth terminal, obovate, trigonous, angles hairy, mouth tubular.

Small tufts, whitish green. Stems $\frac{1}{2}$ in. long, branched irregularly. Leaves closely imbricate, patent, auricles horn-shaped, sub-reflexed. Involucral, erect, dentate, with lanceolate lobule in small branches, almost hiding the perianth; angles of the perianth spinous, curved various.

This description agrees, excepting the angles of the perianth, very nearly with *F. proboscidophora*. Fl. Tasm., 237.

Tasmania, amongst other Hepaticæ, *Hooker*. On trees with *F. deplanata*, Mount Wellington, *R.A.B.*

5. *F. PROBOSCIDOPHORA*, *Tayl.* Stems vaguely pinnately branched. Leaves rotundo-ovate, entire; auricles lunate-galeate, acuminate, point decurved. Stipules orbicular, bifid; segments bi-tri-dentate; involucral ovate, acute, dentate; auricles acuminate, margins recurved to the base of the teeth, laciniate; stipules bipartite, laciniate, lanceolate, dentate. Perianth obovate, obtuse, apiculate, dorsal convex, ventral one-keeled, angles undulate. Lond. Journ. Bot., 1846, 402; Syn. Hep. 770. Pl. xxviii.

Brownish-red, whitish, scarious. Stems lin., leaves of fragile texture. Auricles lunate-galeate from the margin, beaked. Stipules about 6-toothed. Perianth very fragile.

Very nearly allied to *F. Hampeana*, but a larger species, remarkable in the few specimens yet seen for the discoloration and scarious appearance of its leaves. Its habit appears to resemble that of *F. dilatata*. The perianth is everywhere smooth, except the angles, which are minutely undulate or sub-crispate. Fl. Tasm. 237 n.

On the bark of trees, Circular Head, *Hooker*. Cheshunt, *Archer*. On bark of trees, Mount Wellington, *R.A.B.*

6. *F. HAMPEANA*, *Nees*. Fl. N.Z. ii., 160. Stems pinnate. Leaves pale green, imbricate, $\frac{1}{2}$ -vertical, sub-orbicular; lobule arched, deflexed, acuminate. Stipules sub-orbicular, 6-8 toothed, and 2-fid. Syn. Hep. 426.
Tasmania, *Hooker*. (Australia, New Zealand.)

7. *F. CONGESTA*, *Hook. f.* and *Tayl.* Stems tufty, procumbent, branched. Leaves imbricate, entire, ovate, sub-

apiculate. Lobule inflated, oblong. Stipules minute, ovate-rotund, bifid, not toothed. Perichæatial leaves oblong, apiculate, entire, whitish at the tips.

The leaves have not enlarged cells at the base, as in *F. aterrima*.

Patches several inches wide, reddish-brown. Stems nearly 2in. long, irregularly yet somewhat pinnately branched; branches erecto-patent, curving upwards. Leaves concave, usually apiculate; the auricle reaches below the lower margin of the leaves, and is removed from contact with the stem. Stipules quite entire, with acutely bifid tops; they are scarcely wider than the stems. The barren perichætia have a rounded summit, which probably is altered in the calyciferous plant; the leaves are all erect, acuminate, and entire, the two lateral are oblong, each with an inner lobe whose margin is reflexed, the third or stipular leaf is divided deeply into two lanceolate, apiculate, entire segments.

The present is nearly allied to *F. aterrima*, which is, however, readily and exactly distinguished by its black colour, by its less acuminate perichætial leaves, and principally by its entire stipules. Lond. Journ. Bot. 1844. 396.

On the bark of *Fagus*, St. Patrick's River, *Gunn*. On trees, Oven's Creek, *Archer*. On cliffs, Mount Knocklofty; Sawpit Creek, Mount Wellington; Wellington Falls. R.A.B. (New Zealand, Lord Auckland's Group.)

8. *F. MEGALOCARPA*, *Hook. f.* and *Tayl.* Stems procumbent, loosely bi-pinnate. Branches slender. Leaves imbricate, oblong-ovate, acute, recurved, entire. Auricles oblong-clavate, parallel with the stem, a subulate style interposed between the auricle and the stem. Stipules minute, bifid. Perianth terminal, oblong, flat above, obtusely keeled below, mouth tubular; perigonia round, sessile.

Minute, scattered, brown. Stems scarcely lin. long. Shoots of equal breadth. Both perigonia and calyces large in proportion to the shoots. It is more minute and slender than *F. exilis*, *Tayl.*, and readily distinguished by the style interposed between the auricle and the stem. Lond. Journ. Bot. 1846. 404.

Tasmania, on mosses; *Herb. Greville*.

9. *F. DIPLOTA*, *Tayl.* Lond. Journ. Bot. 1846. 405. Stems about 4 lines long, reddish, twisted, procumbent, sub-

pinnate, pinnules lax; leaves imbricate, amplexical, sub-quadrate-rotundate, entire, apices recurved, dorsal margin gibbous; very thin; auricle oblong from a narrow base, rising from the base of the leaf; a very short lanceolate style interposed between the stem and the auricle, the style scarcely more than half as long as the auricle. Stipules distant, rotundo-ovate, bifid, entire. The cells of the leaves near their junction with the stem are much larger than elsewhere. Pl. ii. f. 3. Pl. xxix.

On rocks, Proctor's Road, creeping amongst *F. falciloba*. R.A.B.

10. F. REPTANS, *Mitten*. Fl. N.Z. ii., 161. t. 104. f. 4. Stems small, slender, $\frac{1}{2}$ in. long, creeping, pinnate. Leaves dark olive brown or red or blackish, loosely imbricate, spreading, orbicular-oboate; lobule very large, occupying the centre of the leaf and $\frac{1}{3}$ smaller, compressed, semi-orbicular, black; involucre with a lanceolate 1 dentate lobule. Stipules small, cuneate, 4 toothed; involucre 2-fid, 1-dentate on each side. Perianth oblong-obovate, mucronate; dorsal face flat, 2-keeled; ventral convex, 4-keeled; keels toothed above. Pl. xxix.

On very wet and rotten wood; Goat Hills, New Norfolk, *Oldfield*. On rocks Mount Nelson, R.A.B. (New Zealand.)

11. F. GAUDICHAUDII, *Mont*. Annals des Se. Natur. 1836. p. 13, t. 2 f. 2; Syn. Hep. 435.

Tasmania, *Admiral d'Urville*, in *Herb. Montagne*.

29. POLYOTUS, *Gottsche*.

Fruit lateral, lobule inflated, galeate.

Involucre leaves overlying each other, adnate below.

Stems prostrate, pinnately branched. Leaves incubous, closely imbricate, auricled, the auricle often spinous, with a lamina of various shape between it and the blade of the leaf. Stipules usually 4-fid, the middle lobes clavate. Fruit lateral or axillary. Involucre of many confluent leaves. Perianth 0. Calyptra confluent with the involucre, its apex free, bearing sterile pistils near the apex. Capsule oblong, on short fruitstalk; elaters with 2 spiral fibres. Antheridia solitary in the axils of terminal perigonal leaves.

A small Australian, New Zealand, and Antarctic genus, not found in the Northern Hemisphere. Hook. Hand-book, 528.

Leaves yellow-brown, stipules 4-partite.

1. *P. CLAVIGER*, *Gottsche*. Stem creeping, 3-4in. long, 2-pinnately branched. Leaves yellow-brown, closely imbricate, plane or convex, ovate-cordate, acute or apiculate, quite entire or more or less toothed; auricles clavate, with a large triangular lamina. Stipules 4-partite; segments with revolute margins, entire or toothed, 2 intermediate, often saccate. Involucre cylindric-ovoid, rough, with the adnate involucreal leaves. Hook. Handbook, 529; Fl. N.Z. ii., 152; Syn. Hep. 215; Hook. Musc. Exot. t. 70. Pl. xxix.

Var. γ *Taylori*, cauline leaves toothed, spinous on the ventral margin. *P. Taylori*, Syn. Hep. 246.

St. Patrick's River, *Gunn*. Fork Creek, Mount Wellington, *Rodway*. (New Zealand, Campbell's Island, on alpine rocks).

Leaves dark purple, stipules 4-partite.

2. *P. BRACHYCLADUS*, *Gottsche*. Stems 3-4 inches long, 2-pinnate; branches very short. Leaves dark purple-brown, orbicular-cordate or broadly ovate, ciliate; auricles club-shaped, with no spine, saccate, purple, rarely flat and ciliate. Cauline stipules 4-partite, segments entire, toothed or cut, those of the branches with 2 intermediate auricles. Involucre conical, cariaecous, leafy; leaflets spinous-ciliate. Hook. Handbook, Fl. N.Z. 529; Syn. Hep. 247; Fl. Tasm. ii., 234 t. 180, f. 2. Pl. iii. f. 4; Pl. xxix.

Tasmania, *Neill*, 1824. *Spence* (*Herb. Greville*).

Cauline stipules 2-fid.

3. *P. MAGELLANICUS*, *Gottsche*. Stems creeping, 3-pinnate. Leaves brown-purple, imbricate, ovate-orbicular, spinous-ciliate; cauline auricles variable, clavate, saccate, setigerous or plane, with laciniate segments; laminae larger, 3-angular, sometimes sub-cucullate. Cauline stipules orbicular-ovate, 2-fid, entire or ciliate, those on the branches 2-fid, lacerate or clavate. Involucre very large; leaves convolute, ciliate. Hook. Handbook Fl. N.Z., 529; Syn. Hep., 248; Hook. Musc. Exot. t. 115; Fl. N.Z. ii., 153. Pl. xxix.

St. Patrick's River, in great profusion, and finely fruiting, *Gunn*. Mount Wellington and Kermantid River, South Huon, *Oldfield*. Cheshunt, *Archer*. Gullies, Mount Wellington, abundant, *Rodway*, *Taylor*, *R.A.B.* (Australia, New Zealand, Campbell's Island, Fuegia.)

30. FOSSOMBRONIA, *Raddi*.

Complete perianth on upper side of frond; leaves angular.

Frond prostrate, creeping, lobed pinnately; lobes succubous, distichous, quadrate, 3-5 lobed, flaccid. Stipules 0. Fruit terminal, or lateral by the growth of the stem. Involucre of subulate leaves, adnate to the perianth, which is campanulate; mouth large, lobed. Calyptra pyriform. Capsule on a short fruitstalk, globose, irregularly 4-valved; elaters short, with 2-3 spiral fibres. Antheridia naked on the upper surface. Intermediate between the truly foliaceous and the frondose Hepaticæ.

1. *F. PUSILLA*, *Nees*. Minute; stems $\frac{1}{4}$ in. long, simple or forked. Leaves obliquely spreading, lower waved and lobed, upper crisped, 3-4 lobed or angled. Perianth obconic, toothed. Hook. Handbook, Fl. N.Z., 539; Syn. Hep. 467; Fl. N.Z. ii., 163. Pl. xxx.

Either detached or in tufts or patches. Stems prostrate, about a $\frac{1}{2}$ in. in length, thick in proportion to their size, and unbranched, rooting from the under surface. Leaves closely set in two opposite rows, squarish and crisped or waved, with the extremity cut into from two to four irregular notches. Calyx large and campanulate, with a cleft in the margin, and the border lobed and waved. Five erect thread-like filaments surround the base.

Moist banks. Fruits in Autumn and Spring. Cook's Brit. Hep. 22.

Damp ground; hillside, Woodburn, near Richmond, and wet crevices of rocks; gully by Brown's River, *Oldfield*. Gathered also by *Mr. Archer*. Launceston, *Miss Oakden*. (Australia, New Zealand, America, Great Britain, Canary Islands, South Africa, Kerguelen's Island.)

2. *F. INTESTINALIS*, *Tayl*. Frond simple, prostrate, linear, flexuous. Lobes imbricate, ascending, alternate, tumid, convolute, incised and lobed; perianth campanulate, crenate.

Fronds 3-4 lines long. Roots purple. Lobes when moistened, are very tumid, and have their incurved margins concealed. Capsule spherical, bursting irregularly. Seeds muricate, very black. Elaters longer than in *F. pusilla*, *Nees*; besides the calyx is far smaller, and the convoluted lobes give to our plant a peculiar habit. Lond. Journ. Bot. 1846. 408; Syn. Hep. 469. 785.

Cheshunt, *Archer*. (New Zealand.)

31. ZOOPSIS, *Hook. f. and Tayl.*

FronD continuous, with alternate lateral projections.

FronD very slender, tufted, creeping, rigid, silvery green, almost capillary, sparingly branched, of large tumid, hexagonal cells; midrib stout, margins waved. Fruit lateral. Involucre of a few lanceolate scales. Perianth large, pedicelled, obvate-oblong, deeply laciniate. Hook. Handbook, Fl. N.Z. 540.

1. Z. ARGENTIA, *Hook. f. and Tayl.* Fl. N.Z. ii., 164.

FronDs $\frac{1}{4}$ to $\frac{1}{2}$ in, long. 1-20th in. broad, of 2 lateral and 1 antero-posterior series of cells surrounding a central cord of filiform cells; each of the marginal cells stands out like the tooth of a saw, and is sometimes terminated by a bristle. Syn. Hep. 473. 785. Journ. Linn. Soc. xiii., 188. Pl. xxx.

The Bedchamber, New Norfolk, *Oldfield.* Frequent, intermixed with mosses and Hepaticæ, *Archer, R.A.B.* (Australia, New Zealand, Lord Auckland's Group.)

2. L. LEITGEBIANA, *Carr. et Pears.* *Cephalozia* (*Zoopsis*) *Leitgebiana.* For a complete illustration and description of this interesting plant, see communication from Messrs. Carrington and Pearson, in the current year's proceedings. Pl. xxx.

Creeping amongst *Gottschea Lehmaniana*, Gully, Mount Wellington, *R.A.B.*

32. PODOMITRIUM, *Mitten.*

Complete perianth from the under side of a continuous frond.

FronDs erect from a creeping rhizome, stalked, oblong, with a stout midrib, membranous entire. Inflorescence dioecious. Involucre from the base of the frond on the ventral surface, shortly pedicelled, with a few scales at the base. Perianth tubular, much longer than the involucre. Calyptra included, bearing a few barren pistils, sub-campanulate; mouth lacerate. Capsule on a long fruitstalk, ovoid, 4-valved; elators filiform. Antheridia crowded on short pedicelled spikes.

The only species known; it is almost impossible to distinguish its barren fronds from those of the British *Steetzia Lyallii* and *Symphyogyna subsimplex*. *Mitten*, in Hook. Handbook Fl. N.Z. 540.

P. PHYLLANTHUS, *Mitten.* Fl. N.Z. ii., 164. FronDs lin. high, oblong-lanceolate, dull green, obtuse, quite entire. Hook. Handbook Fl. N.Z. 541; *Symphyogyna*, Fl. Antarct. 167. *Jungermannia* Hook. Musc. Exot. t. 95. *Steetzia Phyllanthe* Nees. Syn. Hep. 478. Pl. ii., f. 4. Pl. xxxi.

Diplolæna cladorhizans, Hook., f. et Tayl. Patches loose, wide, very pale green in the younger parts, pale olive in the older. Fronds a little more than an inch long, lanceolate acuminate into an elongated point consisting almost entirely of the nerve, and radicing at the summit, and thence in the following season, sending out new fronds. The nerve is whitish and stout, though slender. The perichætium or outer calyx occurs at the base of the frond, and on its inferior side it is attached to the nerve; there are often three together, its exterior scales are rotund and deeply toothed, the interior scales are united at their bases, and have setaceous cilia which are jointed; from the centre of these issues the true calyx, large in proportion to the size of the frond, slightly bent upwards, pale flesh-coloured, its mouth lacinated, and the lacinae elongato-ciliate. Lond. Journ. Bot. 1844. 570.

St. Patrick's River, Gunn. South Huon, Oldfield. West-end Rivulet, Archer. Ulverstone, Miss Lodder. Mount Wellington, Rodway, R.A.B.

33. STEETZIA, Lehmann.

Complete perianth on upper side of a continuous frond.

Frond linear, more or less dichotomously branched, with a midrib. Inflorescence diœcious. Involucre at first terminal, dorsal by the subsequent elongation of the frond, seated on the midrib, cup-shaped, torn. Perianth tubular; mouth toothed. Calyptra as long, torn at the apex. Capsule on a slender fruitstalk, ovoid; elaters free, with 2 fibres. Antheridia dorsal, on the midrib, covered by minute fimbriated leaves. Hook. Handbook. p. 541.

1. S. PISICOLOR, Hook. f. et. Tayl. Crypt. Antarct. 138. Pl. 160, f. 7.

Diplolæna, Nees. Fronds erect, in loose tufts, dichotomous. Lobes linear, concave, obtuse, emarginate, nerved.

Fronds nearly 3in. high, pea-green in the younger and upper part, blackish below, two or three times dichotomous; the nerve in the dried state is very thin and whitish, but when the frond is thoroughly moistened, it swells and becomes of the same colour as the rest of the frond, while the lobes become concave or channelled, the branches separate at an acute angle. New fronds issue from the sides of the old by

a bursting of the latter; such new shoots have rounded bases, which immediately send down roots, probably they separate in time and continue an independent existence. Lond. Journ. Bot., 1844, 479.

The fructification of this very distinct species has not yet been seen, but the fronds agree with those of *Steetzia* or *Symphogyne*. Fl. Tasm. ii., 238.

York Town Rivulet and St. Patrick's River, *Gunn*.

2. S. LYELLII, *Nees*. Frond 2-3in. long, oblong or linear, crenulate or subserrate.

Blyttia, Syn. Hep. 475 (*Steetzia* 785); Hook. Britt. jung. t. 77; Fl. N.Z. ii., 165; Hook. Handbook Fl. N.Z. 541. Pl. xxxi.

Blyttia Lyellii. End growing in small loose patches. Frond about an inch in length, and scarcely a quarter of an inch in width, with a few short side lobes, or forked at the extremity, waved at the margins, occasionally slightly toothed, with a distinct midrib or nerve prominent on both sides. Fruit seated upon the nerve on the upper side near the middle of the frond. Calyx double, the outer shortest, much notched at the margin, the inner or true calyx, cylindrical, slightly toothed at the mouth, and torn on one side. This species is readily known from *Morckia hibernica*, by the presence of a decided nerve. Cook's Britt. Hep. 22.

Gullies on the sides of Mount Wellington, in crevices by the sides of rivulets, and Wellington Falls, *Rodway*, *R.A.B.* (Australia, New Zealand, America, Europe.)

34. SYMPHYOGYNA, *Mont. and Nees*.

No Perianth.

Calyptra on upper side of often stipulate frond; nerve narrow.

Fronds membranous, linear, dichotomously or flabellately branched, stalked, arising from a creeping rhizome, midrib stout. Inflorescence monœcious, or diœcious. Fruit from the nerves, usually at the forks. Involucre a toothed scale. Perianth 0. Calyptra smooth, exerted, coriaceous, fimbriated at the apex by abortive pistillidia. Capsule on a slender fruitstalk, 4-valved; valves often cohering by their apices; elaters with 2 spiral fibres. Antheridia in the midrib; perigonal leaves imbricate, tumid, incised, membranous.

1. *S. FLABELLATA*, *Montagne*. Stems 1 to 3in. high. Frond orbicular or reniform, 3-5 partite, in a fan-shaped manner, $\frac{1}{2}$ to 1in. broad, segments linear, 2-fid, nerved, obtusè. Fruit in the forks. Involucral scales 2-lobed. Fl. N.Z. ii., 165; Syn. Hep. 481; *Jungermannia*, Hook. Musc. Exot. t. 13; Labil. Fl. Nov. Holl. t. 254. f. 1. Pl. xxxi.

St. Patrick's River, *Gunn*. Back River Gully, *Oldfield*, *Archer*. Ringarooma, *Shepherd*. Wedge Bay, *Clark*. Launceston, *Miss Oakden*. Sawpit Creek, Mount Wellington, *R.A.B.* (New Zealand, Lord Auckland's Group.)

2. *S. HYMENOPHYLLUM*, *Montagne*. Stipules 1-2in. high. Frond, flat, erect, dark green, obtruncate or obovate, twice or thrice 2-fid; segments linear, serrate, emarginate. Fruit at the union of the lacinæ; involucral scale orbicular, toothed. Calyptra cylindric. Fl. N.Z. ii., 166; Syn. Hep. 480; *Jungermannia*, Hook. Musc. Exot. t. 14. Pl. xxxii.

Fern Tree Gully, Mount Wellington, *R.A.B.*

3. *S. RHIZOBOLA*, *Nees*. Stipes short. Frond procumbent, lanceolate, sub-divided, dark green, serrate, attenuated and rooting at the apex. Fl. N.Z. ii., 166; Syn. Hep. 483; *Jungermannia*, Hook. Musc. Exot. t. 14. Pl. xxxii.

S. obovata, Lond. Journ. Bot. 1844, 581; *S. pulchra*, Lond. Journ. Bot. 1846, 410.

The *S. obovata*, *Hook. f.* and *Tayl.* corresponds with what is understood as the fertile state of *S. rhizobola*, the attenuations of the apices of the divisions of the fronds being absent. The specimens gathered by Dr. J. D. Hooker are finely in fruit, and the fertile stems are mixed with others corresponding in structure, but differing in habit, being prostrate and rooting at the apices, like the plants figured in Musci Exotici. See note Fl. Tasm. ii., 239.

Tasmania, *Gunn*. On the ground in very wet places, in dense shade. St. Patrick's River, Back River Gully, and Mount Wellington, *Oldfield*. West End Rivulet, *Archer*. St. Crispin's Well and Wellington Falls, *R.A.B.* (Australia, New Zealand, Bourbon.)

4. *S. LEHMANNIANA*, *Mont. et Nees*, Syn. Hep. 483; *Mitten*, Tasmania, *Archer*; in Fl. Tasm. ii., 239, n. 3.

There are no specimens of this or the succeeding species in *Archer's* collection, Royal Society's Library, Tasmania.

5. *S. RHODINA*, *Hook. f. et Tayl.* Frond minute, oblong, dichotomous, tender, pellucid, costate. Calyptra very long, linear, roseate. Capsule linear, oblong. *Lond. Journ. Bot.* 1845, 93; *Syn. Hep.* 487.

Frond 2-3 lines long, calyptra much shorter. Involucral scales about the base of the calyptra 4 or 5 dentate, apices setaceous, erect. The spores and elators frequently emitted from a lateral cleft in the capsule, or in an indefinite number of valves, the apices of the divisions always cohering. The whole plant is rose-coloured.

Sufficiently different from any other Tasmanian species. From the description of the capsule it may be doubtful if it truly belongs to this genus. *Fl. Tasm.* ii., 239.

Tasmania, *Archer*.

35. METZGERIA, *Raddi*.

No Perianth.

Calyptra on under side of continuous frond.

Fronde more or less branched, flat, linear; midrib distinct. Inflorescence dioecious. Fruit from the lower surface of the frond, on the midrib. Involucre a ventricose 2-lipped scale. Perianth 0. Calyptra ascending, obovoid, rather fleshy. Capsule on a long fruitstalk, ovoid; elators adhering to the tips of the valves, with one spiral fibre. Antheridia 1-3 from the midrib beneath the frond, in a 1-leaved involucre. Ovoid buds occur on the narrow tips of the fronds.

1. *M. FURCATA*, *Nees*. Fronds $\frac{1}{2}$ to 3in. long, tender, linear, forked or dichotomously branched, glabrous, the margin and costa beneath setulose or naked. Calyptra ascending from the side, hairy and setose. *Fl. N.Z.* ii., 166; *Syn. Hep.* 502; *Fl. Antart.* 167 and 445; *Fl. Tasm.* ii., 239; *Pl. ii. f. 5*, *Pl. xxxii*.

Var. β . 1. *major*: St. Patrick's River, *Gunn*.

Var. β . 2. *minor*: running over the surface of rocks, Launceston, *Gunn*.

Var. ϵ . *prolifera*: Tasmania, *Gunn*. Back River Gully, *Oldfield*. Cheshunt, *Archer*.

On trees, in gullies, Mount Wellington, *R.A.B.* (Cosmopolitan.)

2. *M. ERIOCAULA*, *Gottsche*. See *Sarcomitrium eriocaula*. *Pl. xxxii*.

36. SARCOMITRIUM, *Corda* (*Aneura*).*No perianth.*

Calyptra lateral; frond composed almost entirely of thickened nerve. Frond pinnatifid or 2-pinnate, sinuate, rather thick, with a broad undefined nerve or 0. Inflorescence diœcious. Fruit from the margin of the frond underneath. Involucre short, cup-shaped, torn. Perianth 0. Calyptra sub-cylindric, fleshy. Capsule ovoid or oblong, on a slender fruitstalk; elaters attached to the tips of the valves, each with a single broad fibre. Antheridia immersed in marginal receptacles.

In Hooker's Handbook to Fl. N.Z., this genus is named *Aneura*, and the following note occurs:—In the New Zealand Flora Mr. Mitten adopted the generic name of *Sarcomitrium* in preference to that of *Aneura*, because the fronds have a nerve or thickened axis, and indeed consist of little else than axis. Names are, however, as often founded on appearances as on facts, and if the appearance is obvious, as in this case, the name should be retained. A considerable genus, more common in the Southern than in the Northern hemisphere.

Flor. Nov. Zeal. ii., 167 n. This genus contains all the *Aneuræ* and part of the *Metzgeriæ* of the Syn. Hep. where the fronds have been described as nerveless, though consisting of very little beside nerve. In *S. pingue* and the wider 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.

Margin remotely toothed.

1. *S. alternilobum*.

Branches palmately divided.

2. *S. palmatum*.

Branches pectinately divided.

3. *S. multifidum*.

Frond narrow at base, swollen, vaguely lobed, margins lobed.

4. *S. pinguis*.

Frond erect, linear, pinnate.

5. *S. aleicorne*.

Frond rigid, brown or blackish green, pinnate.

6. *S. crassum*.

Frond simple or pinnatifid, branches dilated at the apex.

7. *S. pinnatifida*.

Frond long, pinnatifid, pubescent.

8. *S. eriocaula*.

Frond short, fleshy; lobes cochleate, concave.

9. *S. cochleatum*.

1. *S. ALTERNILOBUM*, *Hook. f. et Tayl. (Aneura)*. Frond dark green, 3-4in. long, flattened, vaguely branched; branches alternate, 1-6th in. broad, obtusely lobed, crenate, tips rounded; margin minutely and remotely toothed. Calyptra setulose. *Hook. Handbook Fl. N.Z.* 543; *Syn. Hep.* 496.

Blackish green. Frond 2in., vaguely branched, narrow, procumbent, apex rounded and crenulate. Calyptra covered with pale setæ. Capsule linear-oblong; pedicel 1in. Distinct from *S. pingue (Linn)* in its more regularly alternately lobed fronds, which have their margins remotely denticulate, and which appear to be of a thinner texture. *Fl. Nov. Zeal. ii.*, 167.

Fronds sparingly branched, crossing one another but scarcely matted together, about 3in. long and 2 lines wide, of the colour of dried specimens of *J. multifida*, L., having a pinnate appearance from the short, alternate, obtuse lobes, each of which is truly bilobate at the summit with a very shallow sinus; the margin exhibits very minute teeth pointing in various directions. The substance of the frond is very thin, yet along the longitudinal axis it is carnose and has the cells indistinctly separated, which is by no means the case near the margin. Beneath there are brownish-white rootlets limited to the central parts of the frond and its lobes.

This species belongs to the section of the genus with nerveless fronds. By the greater breadth and shortness of its lobes, as well as by the sinus at the summit of each, it is at once distinguished from the broadest specimens of *J. multifida*. *Lond. Journ. Bot.* 1844, 572.

St. Patrick's River and Acheron River, *Gunn*. Clayey banks of the Kermandie Rivulet, North-West Bay Gully and elsewhere, on very wet banks, *Oldfield*. (New Zealand.)

2. *S. PALMATUM*, *Mitten. Aneura palmata Nees*. *Syn. Hep.* 498; *Jungermannia palmata*, *Hedwg. Theor. gen. ed. i. t. 18. f. 93-95*. Fronds pinnate, primary flat, procumbent; branches ascending, pinnatifidly palmate; segments linear, truncate or obtuse. Fruit lateral; involucre shallow, torn. Calyptra tubercled. *Hook. Handbook. Fl. N.Z.* 543. *Pl. xxxiii.*

Fronds usually crowded, two to three inches high, divided palmately into narrow lobes, sometimes creeping. Calyptra clad with tubercles. In old bogs. *Cook's Britt. Hep.* 24.

Cheshunt, *Archer*, Distillery Creek, Launceston, *Miss Oakden*. Wellington Falls, *Rodway*, Gullies Mount Wellington, *R.A.B.* (New Zealand, Europe.)

3. S. MULTIFIDUM, *Mitten*. *Aneura multifida*, *Dumart.* Syn. Hep. 496; *Jungermannia multifida*, Linn. ed. 2. 1,602. Frond pinnately multifid or decomposed; primary bi-convex, rigid; branches pectinate, horizontal, linear; involucre lateral in the primary or secondary branches, turbinate, fleshy. Calyptra tubercled. Hook. Handbook, Fl. N.Z., 543; Hook. Brit. Jung. t. 45; Fl. Antart. 167 et 444. Pl. xxxiii.

Generally growing in thick crowded tufts. Fronds from $\frac{1}{2}$ to $1\frac{1}{2}$ in. long, usually erect, but sometimes prostrate, much divided in an irregular manner, nerveless, fleshy, and of a pale green colour. Fruit rising from beneath the margin, but not at the apex. Calyx very short, cup-like, and toothed at the edge. Capsule large, brown, and furrowed. Very variable. Wet places. Fruits in spring. Cook's Brit. Hep. 24.

St. Patrick's River, *Gunn*. Mount Wellington, *R.A.B.* (Australia, New Zealand, Lord Auckland's Group, Campbell's Island, Europe, America, India, Fuegia.)

4. S. PINGUE, *Mitten*. *Aneura pinguis*, *Dumart.* Syn. Hep. 493; *Jungermannia pinguis*, Linn. Sp. Pl. ed. 2. ii., p. 1,602.

Growing in loose patches. Fronds one or two inches long, often overlapping, and of an oblong figure, narrowest at the base, either simple or with one or two large lobes, the margins of all cut into smaller lobes, swollen in substance but nerveless. Fruit arising from the under surface of the frond near the edge. Calyx nearly hemispherical, expanded at the mouth and fringed. Capsule red-brown and furrowed. Damp ravines and bogs. Fruits in summer. Cook's Brit. Hep. 23. Pl. xxxiii.

Springs, Mount Wellington, and on muddy banks, *Oldfield*, (Australia, Europe.)

5. S. ALCICORNE, *Mitten*. Fl. Antarctica, 139 pl. 160, f. 8; *Aneura alciornis*, Hook. f. et. Tayl. Lond. Journ. Bot. iii., 479. Cæspitose. Frond erect, linear, alternately and bi-pinnately lobed; lobes linear, sharp, subtruncate. Calyptra lateral, linear, whitish, scabrous, apex lacerate. Pl. xxxiii.

Fronds tufted among other Hepaticæ, or Musci, about lin. high; the younger parts of a lively grass-

green, the lower and older brownish, and turning black in drying. The lobules rise to nearly the same level, consequently the lower branches have a dichotomous appearance; the lobes are widest when they are about to divide into lobules; these are linear, short, and end abruptly. The Calyptræ issue from the sides of the plants, and rise to such a height that their tops came on a level with the tufts of the fronds; the calyptræ are very long, pale, carnosé, and rough with projecting points. Pedicel about $\frac{1}{2}$ in. long. Capsule cylindrical.

This species is allied to *L. palmata* (*Hoffm.*), but is far more compounded in its divisions, which are pinnate and not palmate, the lobules are far narrower, and the calyptræ are born higher up on the frond.

On rocks and in slowly-running streams, Mount Wellington and elsewhere. *Oldfield, Archer.*

6. *S. CRASSUM*, (*Schwægr, Mitten* in Fl. N.Z. 167.) *Aneura crassa*, *Nees*; Syn. Hep. 500. Frond thick and leathery, almost horny, blackish-green, procumbent, pinnatifid; segments obtuse.

Of a very rigid and opaque texture, and of a brown or blackish-green colour; the stems are branched in a pinnate manner, and when dry the plants are almost horny. Fl. Nov. Zeal. 167.

Acheron River and Arthur's Lake, *Gunn, Cheshunt, Archer.* Wellington Falls, *R.A.B.* (New Zealand.)

7. *S. PINNATIFIDUM*, *Mitten.* *Aneura pinnatifida* *Nees*, Syn. Hep. 495. Frond simple or pinnatifid, flat or channelled; branches horizontal, dilated at the apex, 2-pinnatifid, or toothed, obtuse. Calyptra smooth, puberulous. Hook. Handbook, Fl. N.Z. 543. Pl. xxxiv.

St. Patrick's River, and in a rivulet at an altitude of 5,000ft., Western Mountains, *Gunn.* Oven's Creek, *Archer.* Mount Wellington, *R.A.B.* (Australia, New Zealand, Europe, America, Bourbon, India, Malay Islands.

8. *S. ERIOCAULUM*, *Mitten.* *Metzgeria eriocaula*, Syn. Hep. 505; *Jungermannia eriocaula*, Hook. Musc. Exot. t. 72. *Aneura eriocaula.* Fronds 3-6in. long, flexuous, pinnatifid, pubescent; primary, creeping, compressed; branches alternate, ovate, 2-pinnatifid; divisions linear, obtuse. glabrous, costate, brown. Calyptra sub-axillary, oblong-cylindric, fleshy, glabrous, rather rough. Easily distinguished by its short pubescence. Pl. xxxii.

Back River Gully, *Oldfield.* (New Zealand.)

9. *S. COCHLEATUM* Mitten. *Riccia cochleata*, Crypt. Antarct. 56, Pl. 66, f. 5, Hook. f. and Tayl. Lond. Journ. Bot. iv. 96. Frond short, very thick and fleshy, loosely cæspitose, procumbent, creeping, pinnatifidly irregularly lobed; lobes ovoid, cochleate, concave, very thick and fleshy, with upturned or connivent margins, 2-lobed at the apex, loosely cellular and spongy internally. Calyptra fleshy, cylindric, setulose. Hook. Handbook Fl. N.Z. 544. Pl. xxxiv.

This species seems always recognisable by the pale, slightly thickened row of marginal cells. Fl. Tasm. ii., 240, n.

The Falls, Cheshunt, *Archer*. Lord Auckland's Group.

37. *RICCIA, Micheli.*

Often floating on water, fruit embedded in substance of frond.

Small, frondose, terrestrial or aquatic, often of thick consistence. Fronds simple or divided, usually orbicular or oblong, often stellate. Inflorescence monœcious or diœcious. Perianth 0. Fruit immersed in the frond. Involucre 0. Calyptra cohering with the globose capsule, and crowned with a persistent styloform apex; columella and elaters 0. Spores angular; antheridia imbedded in the frond.

- R. *NATANS*, Linn. Fl. N.Z. ii., 173. Fronds floating pale yellow above, bordered with dull purple, obcordate, channelled, simple or proliferous from the notches, with long purple serrate fimbriæ below; substance, cavernous. Syn. Hep. 606. Pl. 1.

Different from the usual British states of the species, being much more thickly covered beneath with much elongated almost black purple fimbriæ. The upper surface is pale yellow green, bordered with deep purple.

(Floating on Black Lagoon near Tamar Heads, *Miss E. Oakden*. (Australia, New Zealand, Europe, America).)

38. *TARGIONIA, Micheli.*

Fruit terminal on the under side of the frond.

Involucre 2-valved.

Fronds appressed to the ground, rooting, thick and coriaceous, linear, forked, porous on the upper surface, scaly on the

lower. Involucre at the apex of the frond, 2-valved. Perianth 0. Calyptra persistent, enclosing the capsule, breaking away from over it, its bulb immersed in the frond; style deciduous. Capsule on a very short fruit-stalk, membranous, irregularly torn; elaters with 2 or 3 spiral fibres. Antheridia in lateral disc-like receptacles, on proper branches. Gemmæ 0.

T. HYPOPHYLLA, *Linn.* sp. pl. ii., 1,604. *T. Michellii*, *Carda*; *Syn. Hep.* 574. Frond linear-obovate, or cuneate, rigid, with an undefined midrib, pores equal; scales densely imbricate, outer reaching the margin. *Hook. Handbook Fl. N.Z.* 547. Pl. xxxiv.

Fronds forming large patches, overlapping and flat, very deep green, purplish at the edges, oblong, with numerous radicles on the under surface. Fruit originating from the underside of the frond near the extremity. Capsule never elevated beyond the globose calyx, splitting into several unequal segments. Banks, in moist exposed situations. *Cook's Britt. Hep.* 26.

Brown's River, *Oldfield*. Cheshunt, *Archer*. Tamar Heads, *Miss E. Oakden*. (Australia, New Zealand, Europe, N. Africa, N. America.)

39. MARCHANTIA, *Linn.*

Fruit in stalked peltate receptacle. Perianth opening downwards.

Frond broad, growing flat on the ground, branched, thick, with a broad ill-defined midrib or none, covered below with coloured imbricating scales and tubular rootlets. Inflorescence dicecious, on the surface of the frond. Receptacles peltate, stalked, rayed, fruiting on the under surface. Involucres pendulous, alternate with the rays, 2 valved, lacerate, each with 3-6 3-cleft perianths. Capsules stalked, pendulous, dehiscing at the apex by revolute valves; elaters slender; spores smooth. Antheridia immersed in the under surface of male receptacles. Gemmæ occur abundantly in sessile cups on the surface of the frond.

1. *M. TABULARIS*, *Nees*. *Fl. N.Z.* ii., 168. Patches large, oblong, lobed; terminal lobes toothed, nerveless, peduncles 1-4in. long. Female receptacles with 8-9 star-like rays; involucres with 2-4 perianths, 1-4th shorter than the ray, tumid, white, 4-fid; segments lacerate; central beard slender, fibrillose; fruitstalk

short. Male receptacles on separate plants on shorter peduncles, orbicular, 4-lobed; lobes crenate; anthers in 8 radiating lines. Syn. Hep. 525. *M. polymorpha*, Fl. Antarct. 168 and 446, not of Linnæus. Pl. xxxiv. xxxv.

Marchantia polymorpha, Linn., is stated by Dr. Gottsche in "Plantæ Muellerianæ" to occur in Tasmania, but all the specimens yet observed appear to belong to *M. tabularis*, Nees, which differs more in appearance than in any decided character from the European species.

Tasmania, common in wet places where there have been fires, also on tops of hills, *Gunn, Hooker*. Back River Gully, *Oldfield*; elsewhere, *Archer, Miss E. Oakden, R.A.B.* (Australia, New Zealand, Lord Auckland's Group, Campbell's Island, South Africa, Fuegia, Falkland Islands, Kerguelen's Land).

M. PILEATA, *Mitten*, in Fl. N.Z. ii., 169. Frond 3in. long, glaucous green, $\frac{1}{4}$ in. broad, dichotomous, linear, flat, smooth; pores minute, margined with white; margins entire; underneath dark purple. Female receptacle sub-eccentric, hemispherical, tuberculate, naked below, margin crenate; peduncle $\frac{1}{2}$ -in. long, smooth, purple; margin of the involucre torn. Male plant, receptacle on short peduncle, 4-5 lobed, orbiculate, obtuse.

The latter peduncle 2-3 lines long, sealed at the base; receptacle 2 lines wide, margin crenulate.

Only one female receptacle has been seen which has the peduncle inserted either in or very near its centre; it is hemispherical. The plant referred to this species corresponds so nearly in the size, colour, and areolation of its fronds that there seems little reason to doubt its being the male of that described as above from Fl. N.Z. Pl. Tasm. ii., 240, n.

On the ground with *M. tabularis*, *Hooker, Archer*.

3. M. FOLIACEA, *Mitten* in Fl. N.Z., 168. Frond 2-3in. long, subcariaceous, flat, smooth, glossy above; pores small, pale; below deep purple; margin entire, undulate. Female receptacle eccentric, convex, umbovate, about 8-lobed; peduncle lin. long, with purple scales; lobes dilated, foliaceous, sub-crenate; involucre pale, lacerate, ciliate. Cups with gemmæ, funnel-shaped, with toothed ciliate margins.

The surface of the frond is nearly as glossy as that of *M. nitida* of New Zealand.

Tasmania, *Archer*. (New Zealand).

40. REBOULIA, *Nees*.

Fruit in stalked peltate receptacle, no perianth, involucre opening by 2 valves.

Frondose, growing on rocks and earth; habit of *Marchantia*; midrib strong, broad. Female receptacle peduncled, flat, conical, or hemispherical, 1-6 lobed, almost to the middle; lobes thick, their margins forming a 2-valved involucre, containing one capsule. Perianth 0. Calyptra ovoid, soon rupturing, leaving a cup at the base of the capsule. Capsule exserted, sub-globose, membranous, lacerate, or sub-operculate; elaters with 2 spirals; spores tubercled. Male receptacle sessile, discoid.

R. HEMISPHERICA, *Raddi*. Frond dichotomous, with innovations that are rounded and emarginate at the apex, green above, purple below; receptacle variable in shape; hairs at its base very slender. Hook. Handbook. Fl. N.Z. 546. Syn. Hep. 548. Pl. xxxv.

Fronds prostrate, flat, overlapping, from one to three inches long, generally forked, and waved at the margin, of a dark green colour. Midrib prominent. Fruitstalk 2-4in. long. Receptacle cut at the margin into from four to ten equal lobes, covering as many involucre, which are not toothed. It is easily distinguished by the deeply divided 4-5fid receptacle, which is barbate beneath and at the base of the peduncle. Cook's Britt. Hep. 26.

Like the British species, these have the fronds frequently constricted in an articulate manner.

Tasmania, *Hooker*. Gully, Mount Wellington, R.A.B. (Australia, New Zealand, Cosmopolitan.)

41. FIMBRIARIA, *Nees*.

Fruit in stalked peltate receptacle. Perianth split into bands, cohering at their apices.

Frondose, habit of *Marchantia*; midrib keeled. Inflorescence monœcious. Female receptacle hemispherical, concave below; margins expanding and forming 4 campanulate, pendant, 1 capsuled involucre. Perianth projecting beyond the involucre, oblong, splitting into many laciniaë at the mouth. Calyptra fagacious. Capsule sessile, globose, bursting transversely; elators short, with 1 or 2 spirals; spores muricate. Antheridia not on receptacles but immersed in the frond.

1. *F. DRUMMONDII*, *Tayl.* Syn. Hep. 566, 791; Fl. N.Z. 169. Frond 1-1½ in. long, linear-elongate, green or purplish. Female receptacle conical, obtuse, papillose with vesicular cells, almost naked below; perianths white and purplish, broadly ovate, sub 12-fid; segments broad, flat, cohering at the apex; peduncle 2 in. long, slender, black-purple.

Its fronds in size and appearance resemble those of *Reboulia hemispherica*, *Raddi*, and are generally stained above of the deep purple that prevails on the under surface of its congeners.

Tasmania, *Gunn.* Cheshunt, *Archer.* Brown's River, *Oldfield.* (Australia, New Zealand.)

2. *F. AUSTRALIS*, *Hook. f.* and *Tayl.* Fl. N.Z. ii., 170. Fronds lin. long, linear, dichotomous, tender, 2-lobed at the apex, below purple, with a few small lanceolate obtuse scales. Female receptacle conico-hemispherical, tubercled, sub-4-lobed, bearded below with long hairs; perianths ovate, 12-14 fid, pale segments cohering by thin tips. *Hook. Handbook*, 547.

Frond nearly 2 in. long, 2 or 3 times dichotomously divided, narrow base, pale green. Scales beneath frond on each side of midrib, semi-lanceolate, obtuse, purple. Female receptacle conico-hemispherical, divided into 4 blunt lobes, each covering base of a calyptra, receptacle wrinkled. Calyptra obconical acute, tipped with a style, opening by slits. No calyx. Capsule smaller than calyptra, globose, spores angulato-rotundate, spiral filaments as long again as spores. Peduncle thick or opaque below, pellucid above, brownish below, 3 longitudinal grooves. The male receptacle an elevated lenticular disc, dusky purple, rough with prominent cells, cells divided by membranous partitions. Parts of fructification disproportionately small, differs from *F. Drummondii* by greater size, more divided lobes, smaller and more minutely corrugated female receptacles, absence of purplish tinge in calyptra or on the scales of the indusium, fineness of indusial scales, deeper situation of peduncle, and less conical female receptacle. *Abridg. Lond. Journ. Bot.* 1846, 574.

Brown's River, *Oldfield.* Launceston, *Miss E. Oakden.* (New Zealand.)

3. *F. TENERA*, *Mitten.* in Fl. N.Z. ii., 170. Frond ½ in. long, ¼ in. broad, green, dichotomous; divisions oblong or orbicardate, deeply 2-fid, very tender, veined, fertile

cuneate; below green or brownish. Female receptacle small, rather convex, 3-4 lobed, naked below, rugulose; margin crenulate; perianths small, shortly conic, 8-fid; segments pale brown, ovate-lanceolate, separate at the apices. Pl. xxxv.

The deep purple colour so common in these plants is almost absent in this species, the older specimens of which become pale brown.

Tasmania, *Archer*. (New Zealand.)

42. ANTHOCEROS, *Micheli*.

Fronde fleshy, without scales beneath.

Fronde growing flat on the ground, more or less orbicular, radiating, thick or opaque, green. Margins lacerate or crenate. Inflorescence monœcious. Fruit on the upper surface of the frond. Involucre tubular. Perianth 0. Calyptra conical. Capsule pedicelled, of 2 narrow linear erect lobes; columella filiform; elaters flexuous; spiral fibres imperfect or 0; spores muricate. Antheridia sessile, in cup-shaped involucre. Gemmæ also immersed in the substance of the frond.

1. *A. LÆVIS*, *Linn.* Fl. N.Z. ii., 171. Frond 1-2in. long, flat, radiately branched; lobes crenate, smooth, nerveless, tender; involucre cylindric; mouth obliquely truncate, with broad scarious edges. Syn. Hep. 586. *Dendroceros leptohymenius*, Hook. f. et. Tayl. in Lond. Jour. Bot. 1844, 575; Syn. Hep. 580; *Pellia carnosæ*, l.c. 576; Syn. Hep. 490. *A. punctatus* (?) Hook. f. et. Tayl. in Fl. Antart. i. 168. Pl. xxxv.

Near Campbell Town, *Gunn*. In very wet places, under dripping water; Back River Gully, *Oldfield*. West End Rivulet, *Archer*. Wellington Falls, *R.A.B.* (Australia, New Zealand, Campbell's Island, Europe, America).

2. *A. DENTICULATUS*, *Lindenberg.* *Lehm.* pug. Pl. Nov. x. p. 25; *Muell. Frag. Phyt. Austral.*, p. 69. Tasmania, Mount Wellington, *Gulliver*.
3. *A. LONGISPIRUS*, *Carr et Pear.* See description and illustration in the current proceedings of the Royal Society, Tasmania. Pl. ii. f. 7. Pl. xxxv. St. Crispin's Well, Mount Wellington, *R.A.B.*

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