

Notes on Tasmanian Mosses from Rodway's Herbarium: IV

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Family MNIACEAE

This family as treated by Rodway is very heterogeneous, and admittedly so. Modern systematists do not recognise any of his genera as being properly referable there, and would treat *Mnium*, which subsequently to the main work has been found to occur in Tasmania, as the only representative of the family in that country. *Leptostomum*, according to Andrews (*The Bryologist*, 54 : 217), should be a genus of Bryaceae. *Hymenodon*, *Rhizogonium* and *Goniobryum* are now included in Rhizogoniaceae and *Mittenia* is a monotypic genus of Mitteniaceae. The plants of Mniaceae, as now limited, are characterised by the short and wide cells, the leaves often bordered and frequently spinose-dentate, and the nerve seldom far excurrent. The peristome is Bryoid, but the capsule is not pyriform as it so often is in *Bryum*.

Mnium longirostrum Brid. Syn. *Mnium rostratum* Schrad.

A widely distributed species which was added to the Tasmanian flora by Weymouth and Rodway (Papers & Proc. 1921, p. 173), and which is fairly common in New Zealand, being semi-aquatic there on shady rock. The leaves are large, rounded at the apex and with a short apiculus. The margin is strongly bordered and is usually obscurely denticulate above. The nerve is continuous to the apex, the branches long and straggling, and the leaves distant and complanate.

Family AULACOMNIACEAE

A small family consisting of two genera, *Leptotheca* and *Aulacomnion*, both of which are represented in Tasmania and New Zealand. The species of the latter genus is not mentioned in Rodway's work but it is reported in Flora Tasmaniae.

Leptotheca Gaudichaudii Schwaegr.

In this plant there are often produced red-brown brood-filaments in the axils of the upper leaves. I have not seen them in Tasmanian specimens, but they are common in the New Zealand race. The nerve here is rather far excurrent and the leaf cells isodiametrical and smooth. The Musci lists another species from Tasmania, *L. Wattsii* Card. It is not mentioned by Rodway and I have not seen it.

Aulacomnion palustre Schwaegr.

The Flora Tasmaniae mentions that the material here is barren, with pseudopodia, and that the collector was Gunn, "Hab. Formosa". It is described as a slender plant with small leaves, perhaps specifically distinct. I have not seen any Tasmanian collection, but one of the two New Zealand plants that I have examined, and that Dixon considered was a new form, may be identical with Gunn's moss. The species is widely distributed in the northern hemisphere. It differs from *Leptotheca Gaudichaudii* in the nerve failing below the apex and in the markedly papillose cells. As the epithet suggests, it is a hygrophilous moss.

Family RHIZOGONIACEAE

The leaves here are usually toothed, with the margins often thickened. The nerve is strong and the leaf cells mostly small and rounded-hexagonal. Except in *Hymenodon* the peristome is double, as in *Mnium*.

Hymenodon piliferus H. f. & W.

In this delicate little moss the leaf ends in a long fine hair-point. The nerve, though normally failing below the apex, occasionally is produced into, and fills, the hair point. The cells are rounded-hexagonal and mamillate. The outer peristome is wanting, and the inner consists of 16 narrow subulate processes, strongly vertically striate.

Rhizogonium Brid.

A genus that illustrates the artificiality of a primary division into acrocarpous and pleurocarpous mosses. There is a clear affinity with the acrocarpous Mniaceae, but the fruit in *Rhizogonium* is lateral or basal. The leaf cells are isodiametrical, and rounded or irregularly hexagonal. All the Tasmanian species, except perhaps *R. spiniforme*, occur in New Zealand.

Rhizogonium pennatum H. f. & W. The variety *aristatum* (Hpe.) Dixon replaces *R. aristatum* Hpe. which is given by Rodway as a separate species. The Studies (p. 220) suggests that varietal rank may be too high for it. *R. pennatum* resembles *R. distichum* and *R. novae-hollandiae* but differs from both in the stout cartilagenous leaf border and also from *R. distichum* in the excurrent nerve. It is a rare species in New Zealand.

Rhizogonium novae-hollandiae Brid. In the New Zealand plant the leaves when dry are usually distinctly secund, and from Rodway's description this is sometimes the habit in the Tasmanian plant. The leaf often has an indistinct border of 2-3 rows of narrower cells.

Rhizogonium distichum Brid. The serration of the leaf is coarser here than in the two preceding species and the nerve vanishes beneath the apex. There is no trace of a border.

Rhizogonium bifarium (Hook.) Schimp. This is distinct from all the other species in the dendroid habit and in the dimorphism of the leaves, those of the stem being lanceolate or almost subulate and those of the branches being ovate-lanceolate, smaller and relatively wider, and more or less distichous. It is an attractive moss and is very common in New Zealand on logs in the bush.

Rhizogonium mnioides (Hook.) Schimp. In this species the stems are robust, the leaves much crisped when dry, lanceolate-subulate with the margins thickened and doubly toothed nearly to the base. The position of the seta is lateral and the inflorescence is dioicous, whereas in *R. spiniforme* the sporogone is basal and the inflorescence is synoicous.

Rhizogonium spiniforme (Hedw.) Brid. I have seen the collection from Tasman's Peninsula cited by Rodway, and think that it is certainly referable here. The record from New Zealand seems to be rather doubtful. The leaves are not crisped when dry as in the last species, but are rigid and only slightly altered.

Goniobryum Lindb.

Modern research has established that this genus is monotypic, the character of the serrature of the leaf-margin, single in *G. subbasilare* and double in *G. pellucidum*, being inconstant. The lax areolation is unique in genera of Rhizogoniaceae, and this, with the dendroid habit and dimorphic leaves of *R. bifarium*, shows, according to Fleischer, a link between that family and Hypnodendraceae.

Goniobryum subbasilare (Hook) Lindb. Syn. *Goniobryum pellucidum* (Mitt.) Broth. As mentioned above, the tothing of the leaf margin here is variable, it being sometimes single and sometimes double. From Rodway's account it would appear that in the Tasmanian plant, which I have not seen, the serrature is single. The cells are lax and thin-walled, elongate-hexagonal or rhomboid. There is no thickening of the leaf margin. The distribution is Australasian and Fuegian.

Family MITTENIACEAE

Bartram and Dixon (in *Berggren's New Zealand Mosses*, Lund, 1937), have shown that this is a monotypic family, the sole species being *Mittenia plumula* (Mitt.) Lindb. with which *M. rotundifolia* (C.M.) Par. is conspecific. It is a very distinct little moss in the leaves often distichously arranged and widely and far decurrent on the lower side of the leaf base. The peculiar peristome consists of very long filiform outer teeth and short nodulose processes. *M. plumula* is found also in Australia and New Zealand.

Family FISSIDENTACEAE

Though three other genera are recognised in the Musci, there is now a tendency to treat *Fissidens* Hedw. as the sole genus of this very characteristic family. The plants, which are exclusively terrestrial, are recognisable at once by the peculiar structure of the leaves which are distichous, flattened and vertically directed. They clasp the stem in their lower part, the two clasping blades ("vaginant lamina") constituting the true leaf. Above this lamina is a continuation ("upper lamina") which extends to the leaf apex on the inner side of the nerve. On the back of the nerve a wing ("dorsal lamina") extends from the apex to, or nearly to, the leaf insertion. The leaf is usually nerved and is either entirely unbordered or wholly or partially provided with a hyaline border which is often thickened. The cells are hexagonal or rounded. The capsule is small and the peristome more or less dicranoid. The following key to the species of *Fissidens* is in lieu of that of Rodway.

1. Leaves without nerve	1. dealbatus
Leaves nerved	2
2. Leaves with a hyaline border throughout	3
Leaves incompletely bordered	5
Leaves unbordered	7
3. Plants robust, semi-aquatic, border stout	4. rigidulus
Plants smaller, border narrower	4
4. Leaf cells small and obscure, similar throughout the leaf	3. leptocladus
Cells larger, pellucid, lax and elongate in the vaginant lamina	2. pungens
5. Plants minute; border on vaginant lamina only; dorsal	
lamina narrowed in fertile stems	5 Taylori
Plants larger; border intra-marginal on vaginant lamina	6
6. Cells very small (ca. 6 μ) and obscure; leaves sometimes	6. vittatus
faintly bordered on other laminae	
Cells larger (ca 10 μ) and pellucid; border on vaginant	7. integerrimus
lamina sporadic, more often wanting	8
7. Plants small, 1 cm. high or less	10
Plants taller	8. tenellus
8. Vaginant lamina crenulate-denticulate	9
Vaginant lamina entire	9. strictus
9. Aquatic. Leaves rigid, strict and fleshy, apex obtuse ...	
Leaves of thinner texture; apex acute, recurved or incurved	10. pallidus
when dry	
10. Leaves sharply toothed above, with pale but not hyaline	13. adianthoides
border	11
Leaves entire	11. asplenioides
11. Leaves with apex obtuse and inrolled when dry ...	12. oblongifolius
Leaves with more acute apex, only slightly altered when dry	

1. *Fissidens dealbatus* H. f. & W.

There has been a recent finding of this species in Fiji, and it also has a New Zealand distribution. The nerveless leaf and large cells place it at once.

2. *Fissidens pungens* Hpe. & C.M.

Rodway compares this species with *F. Taylori* C.M. and *F. semilimbatus* C.M. & Hpe., but those plants, which are probably conspecific, belong to the section *Heterocaulon* C.M. where the border is only on the vaginant lamina and the dorsal and upper laminae are reduced or suppressed, whilst in *F. pungens*, and other members of the section *Bryoidium* C.M., the leaves are bordered throughout and the laminae are fully developed. J. H. Willis's investigations have shown that *F. pungens* is the earliest publication of a number of Australian species which should be treated as synonyms, and that the New Zealand *F. campyloneurus* C.M. & Beck. is one of them. *F. pungens* is variable, especially in the length and width of the leaf and the length of the seta, but the clear subhexagonal cells and well-developed border are character by which it can usually be recognised without difficulty.

3. *Fissidens leptocladus* C.M. e Rodway. Syn. *Fissidens rigidiusculus* Broth. Proc. Linn. Soc. N.S.W.; 41 : 577.

As Rodway rightly observes, the leaf cells here are characteristic. They are dark, obscure and isodiametrical, about 6 μ as against 10 μ in *F. pungens*. The border is often thin and indistinct, never as stout as it is there. The leaves are often falcate and secund when dry, especially in tall forms. *F. leptocladus* was treated by Brotherus as a variety of his *F. rigidiusculus*. I have not seen specimens of the latter, but from

the description I have no doubt that it comes within the scope of *F. leptocladus*. Brotherus evidently overlooked Rodway's previous publication of Muller's species; otherwise he would have published *F. rigidiusculus* as a variety of it. I do not think that *F. gonioneurus* C.M. e Dixon (Studies, 102) is more than an inconstant form of the present species.

4. *Fissidens rigidulus* H. f. & W.

A robust moss with stems sometimes attaining 5 cm. The leaves are falcate-incurved and twisted when dry, stoutly bordered practically throughout. The cells are dark and opaque. It is more or less aquatic, and often forms dense mats on wet rock. *F. rigidulus* belongs to the section *Pachylomidium* C.M. which is characterised by the bistratose or multistratose leaf-border. It is found in Australia, New Zealand and Chile.

5. *Fissidens Taylori* C.M. Syn. *Fissidens brevifolius* H. f. & W.; *Fissidens semilimbatus* C.M. & Hpe.; *Fissidens elamellosus* Hpe. & C.M.

The Studies reduces *F. brevifolius* to this synonymy, and from what I have seen of Tasmanian and Australian specimens of the two others mentioned I can find no reason for keeping them apart. The areolation is as in *F. pungens* and the plants are very small, as there. In both species the forks of the peristome teeth are spirally thickened, but in the present species the teeth are sometimes not forked but are either entire or cracked on the median line. In the fertile plant the reduction of the upper and dorsal laminae is often very striking, the leaf then being almost entirely composed of the vaginant lamina.

6. *Fissidens vittatus* H. f. & W.

A well-marked species, the vaginant lamina being greatly inflated and its border being distinctly intramarginal in the lower part. The leaves are widely oblong, shortly pointed, and apiculate through the projecting nerve, incurved and falcate when dry. The cells are very dense and obscure. Rodway mentions that the leaf margin is obscurely serrate, and I have seen here and there in my only specimen of the Tasmanian plant some vague notching towards the apex, and also some denticulation in the upper part of the vaginant lamina. In the New Zealand race, where fertile plants have not been found, the leaf margin is quite entire.

7. *Fissidens integerrimus* Mitt. *Fissidens tasmanicus* Broth. e Rodway (Papers & Proc. &c., December 1915).

Confusion has arisen concerning this species owing to Mitten having described the leaf as "immarginata" in Flora Tasmaniae. He overlooked the fact that the lower part of the vaginant lamina is sporadically and intramarginally bordered by a band of narrow cells. The type specimen, which I have seen from his herbarium, shows some of the leaves distinctly so bordered, though the great majority of them are unbordered throughout. Rodway's description of the plant mentions the border and is quite adequate in other respects, but his statement that the locality is not recorded is incorrect because the Flora Tasmaniae and the type specimen's label both mention that the locality was Cheshunt and the collector Archer. Further, Rodway's note might imply that

fruit is unknown, whereas it is partially described in the diagnosis and is present in the type collection. *F. tasmanicus* is distinguished by Brotherus from *F. strictus* H. f. & W. by having the border in question, but both the description and what is evidently part of the type in Rodway's collection fit *F. integerrimus* perfectly. The peristome teeth, the forks of which are spirally thickened, support the view that the plant cannot belong to the section *Amblyothallia* C.M. where the Musci places it, on account of course of the supposed absence of leaf border. Its position in the genus is doubtful since the cells are too large and clear for *Semilimbium* whilst the sporadic and partial border would exclude *Bryoidium*. The distribution is confined to Tasmania.

8. *Fissidens tenellus* H. f. & W.

This little moss is recognisable at once by the absence of border, the regular crenulation of the leaf margin and the frequent denticulation of the upper part of the vaginant lamina. The cells are pellucid and singly papillose. It is found also in Australia and New Zealand.

9. *Fissidens strictus* H. f. & W.

This is a small aquatic species with crowded, suberect, rigid leaves, unaltered when dry and of a fleshy consistency. They are unbordered and rather obtuse, sometimes minutely crenulate in the upper part. The leaf texture gives the cells the appearance of being bistratose towards the nerve. They are irregularly angled and subisodiametrical, noticeably larger near the nerve and there sometimes attaining 18 μ . The species was recently collected by J. H. Willis in Victoria, the first record for Australia. It has not been reported in New Zealand.

10. *Fissidens pallidus* H. f. & W.

This is a pale yellowish moss and differs from *F. strictus* in the acute leaves being strongly incurved or recurved when dry, not strict and rigid as there. The leaf tissue is thinner than it is in *F. strictus* and the margin is not crenulate but quite entire, except, according to the Studies, for some subdenticulation at the apex which I have not seen. Rodway's erroneous statement that the margin is very minutely serrate from cell protuberances was probably caused by confusion of material with *F. asplenioides*, and this supposition is supported by his referring *F. ligulatus* H. f. & W. to the present species, because both Fleischer, in the Musci von Buitenzorg, and Dixon, in the Studies, cite *F. ligulatus* as a synonym of *F. asplenioides*. A further difference between *F. pallidus* and *F. strictus* is that in the former the nerve is thin and colourless, whereas in the latter it is yellowish or red. *F. Whiteleggii* C.M., from Mt. Bischoff, seems to be a tall form of the present species, there being apparently no structural differences.

11. *Fissidens asplenioides* Hedw.

This species has been confused with *F. oblongifolius* and a number of Rodway's specimens are wrongly named as the latter. Several collections merely labelled "*Fissidens*" are also of *F. asplenioides*. The two mosses are much alike, and in both the leaves are obtuse or bluntly acute, with the margins variably crenulate by projection of the cells. The areolation is similar, the cells being rounded and slightly papillose (about

8 μ). The present species differs from *F. oblongifolius* in the leaves when dry being circinate inrolled at the apex, in the junction of the blades of the vaginant lamina being at the nerve and not at the leaf margin, as there, and in the dioicous inflorescence. *F. asplenoides* has a very wide distribution in the Southern Hemisphere. The Musci does not cite it for Tasmania, but Fleischer does.

12. *Fissidens oblongifolius* H. f. & W.

According to Rodway this species is very common in damp gullies, but as he had confused it with the last species it may be as rare there as it is in New Zealand.

13. *Fissidens adianthoides* Hedw.

A very distinct species in the robust habit, leaves irregularly serrate in their upper part, and lateral seta. The cells are large, ca. 18 \times 12 μ , and a few rows at the margin are often paler and incrassate, forming an indistinct border. This species is widely distributed in the Northern Hemisphere, but in the southern it is confined to Tasmania and New Zealand, and, according to the Studies, possibly southern Australia. Dixon has pointed out that the specific epithet should be spelt as above, i.e., with an "h".

Family BRYACEAE

The following key to the genera of this great family is based on Andrew's treatment of it in Grout's North American Mosses. The plants are accordingly divided into two groups, *Pohlioideae* and *Bryoideae*, the former having narrow leaf cells, leaves mostly unbordered and often denticulate, and a peristome with cilia either wanting or imperfectly developed. In the *Bryoideae* the leaf cells are wider, the margin is often bordered, and the peristome has complete and often appendiculate cilia. This division is by no means hard-and-fast, but it seems to recognise two natural groups. I also adopt Andrews' view that the genus *Leptostomum* is properly referable to this family, and that *Mniobryum* should be included in *Pohlia*.

KEY TO THE GENERA

- | | |
|--|---------------------------|
| 1. Leaf cells usually elongated 4 \times 1 or longer | 2. (<i>Pohlioideae</i>) |
| Leaf cells usually broader, less than 4 \times 1 | 5. (<i>Bryoideae</i>) |
| 2. Fruit from base of stem; outer peristome lacking or rudimentary | 1. Mielichhoferia |
| Fruit terminal; outer peristome present | 3 |
| 3. Inner peristome without basal membrane; processes narrow | 2. Orthodontium |
| Basal membrane high; processes well developed | 4 |
| 4. Leaves setaceous; nerve wide | 3. Leptobryum |
| Leaves wider; nerve narrower | 4. Pohlia |
| 5. Capsule erect or suberect; peristome more or less rudimentary; without cilia | 6 |
| Capsule more or less pendulous; processes normal | 6. Bryum |
| 6. Leaves with a long hair-point; cells subquadrate or rounded; peristome consisting only of a low projecting membrane | 7. Leptostomum |
| Leaves without a hair-point; cells rhomboid-hexagonal; peristome with outer teeth and processes | 5. Brachymenium |

1. *Mielichhoferia* Hornsch.

Only one species has been reported from Tasmania, and it has an Australasian and South African distribution. The long seta springs from the apex of a very short lateral branch at the base of the stem. The leaves are lanceolate, mostly denticulate at the apex, and the cells are narrowly linear-rhomboid.

Mielichhoferia Eckloni Hornsch. There is considerable variation in the peristome of this species. Normally there is no trace of an outer peristome, except for a basal membrane which is visible above the mouth, and the processes of the endostome are appendiculate and sometimes anastomosing. There are, however, deviations from this structure, and sometimes rudimentary outer teeth are developed, or the processes may be only slightly appendiculate or even without appendages. The inflorescence is paroicous.

2. *Orthodontium* Schwaegr.

As Rodway mentions, there is here a superficial resemblance to *Weissia*. The appearance of the plants is so different from that of Bryoid mosses in general that the impression is received that the genus may be out of place in that family. This was Fleischer's view, he being inclined to treat *Orthodontium* as a genus of *Meesiaceae*. The plants are small and delicate, with long narrowly linear-lanceolate leaves that are spreading and flexuose, linear-rhomboid cells and a fairly wide slender nerve which is either continuous or lost below the apex. The capsule is erect or inclined, borne on a slender seta and often ribbed. The peristome is double, poorly developed and with the teeth often shorter than the processes. The inflorescence is various, usually autoicous in Tasmanian plants. The genus has recently been revised by W. Meijer, and his treatment of the local plants is shortly as follows. The Australasian *O. sulcatum* H. f. & W. is reduced to a subspecies of the South African and European *O. lineare* Schwaegr., which is the type species of the genus. The antarctic species *O. australe* H. f. & W. is considered to be indigenous in Tasmania in the forms of subspecies *australe* Meijer and subspecies *robustusculum* (C.M.) Meijer. *O. lanceolatum* Mitt. is considered to be a small form of *O. sulcatum* and falls into synonymy accordingly, and *O. pallens* (H. f. & W.) Broth. is added to the Tasmanian flora. Meijer has shown that the plication of the capsule is not a reliable character in the genus, and the Studies (p. 198) voices the same opinion where the question of the separation of *O. sulcatum* and *O. australe* is discussed. The revision would keep the two apart by the longer seta, more oblong capsule, peristome tending to equal length of outer and inner teeth, and broader nerve in *O. australe*, subsp. *australe*. For myself I incline to the view that, since the striation of the capsule is unreliable, there are no differences sufficiently definite to warrant a separation, and as in my opinion they are both merely local races of *O. lineare* I would merge them in that species. It will be noted that Rodway considered *O. sulcatum* as doubtfully distinct from *O. australe*, and that he probably did not compare them with *O. lineare* because he was unaware that in the latter the capsule is sometimes grooved. Muller's *O. robustiusculum* is characterised by the longer seta and larger capsule, the latter attaining a length of 3.2 mm. as against a maximum of 2.5 mm. It is certainly

rather a striking plant in that respect, though many species of bryoid and other mosses show equally well-marked deviations, but if it is to be kept distinct on account of these features then I think that it should be treated as a subspecies or variety of *O. lineare*. *O. pallens* is described as resembling broad-leaved forms of *O. sulcatum*, and is distinguishable by the short seta, small pyriform capsule, undeveloped processes of the endostome, and large spores (20-25 μ). It is in Rodway's herbarium, sub nom. *Apalodium lanceolatum*, from Gordon, and Meijer cites it from "Forest near Leprena, South Coast, Recherche". There seems to be no reason to doubt its specific status.

3. *Leptobryum* Wils.

Leptobryum pyriforme (Hedw.) Schimp. A typically bryoid capsule and peristome are combined here with linear-setaceous leaves having narrowly linear cells and a wide indistinct nerve. The capsule, which is reddish brown and glossy, is of an extreme pyriform shape, the neck being narrowed and quickly tapered and the capsule itself being almost globose. The distribution is almost cosmopolitan. *L. pyriforme* is noted for its habit of colonizing flowerpots in greenhouses.

4. *Pohlia* Hedw.

In this genus the stems are either simple or with basal shoots or innovations from various points on the stem. The leaves are densely arranged and elongated in the fruiting comal part. They are unbordered, denticulate at the apex, with the nerve usually percurrent or failing, and with the cells mostly narrow. In the Tasmanian species the cilia are well developed though not appendiculate. They are often imperfect, or even lacking, in the genus.

Pohlia tasmanica (Broth.) Dixon. Syn. *Mniobryum tasmanicum* Broth. In a former paper (*Synonyms of some New Zealand Mosses*, Rev. Bry. & Lich., 17 : 82) I proposed the reduction of this species to a variety of *P. albicans* (Wahl.) Lindb. I formed this opinion after examining New Zealand forms of what the Studies has treated as *P. tasmanica*, including some specimens so determined by Dixon. I have since had the opportunity of studying the Tasmanian plant in Rodway's herbarium (a metatype from Newtown Falls, No. 142, p. p.) and have come to the conclusion that it should not, so far as can be judged from the available material, be considered as identical with the New Zealand plant. The leaves are narrowly lanceolate or linear-lanceolate and long acuminate, and the cells measure up to about 14 $\mu \times 200 \mu$. The leaves are therefore too narrow for those of *P. albicans* and the cells are too long and narrow. Some of the New Zealand plants cause great difficulty owing to their colouring and areolation, but in the meantime I think that it is advisable to withdraw the variety and treat the Tasmanian species as endemic. The stems are 2 cm. high or shorter, simple or branched above by innovating shoots, and tinted here and there a vinous red. It is evidently hygrophilous.

Pohlia nutans (Hedw.) Lindb. This species is marked by the pale, more or less pendulous capsule, and by the paroicus inflorescence. From the specimens that I have seen in Rodway's collection it seems that the Tasmanian plant, like the New Zealand, often has a very long seta. A

variety *longiseta* Huebn. was set up on this character, but combined with long leaves and larger capsules. In both the Tasmanian and the New Zealand forms, however, a long seta may be combined with short leaves and capsules. The species is almost cosmopolitan.

Pohlia cruda (Hedw.) Lindb. Apparently this species has not been found fruiting in Tasmania. It is recognisable at once by the metallic sheen of the leaves which are yellow-green above and more or less vinous red below, ovate, acute, and with very narrow and elongated cells. It has a wide distribution in the Northern and Southern Hemispheres and occurs in Australia and New Zealand.

5. *Brachymenium* Hook.

A genus where the plants have the habit, leaves and leaf cells of *Bryum*, but in which the capsule is erect and narrow-mouthed and the inner peristome is shorter than the teeth, with the processes rudimentary and usually without cilia.

Brachymenium Preissianum Hpe. This little moss is scarcely distinguishable from a *Bryum* when barren, but it usually fruits freely. The operculum is rather highly conical, sometimes indeed almost rostellate. The suberect capsule with its constricted mouth and greatly widened base is characteristic. Rodway states that the endostome membrane has long slender cilia, but this is incorrect because the cilia are wanting. The structures seen are the processes which in this species are unusually well developed and nearly equal the teeth in height. *B. Preissianum* is fairly common in New Zealand, the usual substrate being calcareous rock.

6. *Bryum* Hedw.

In dealing with this, one of the most difficult of all moss genera, Rodway was at a particular disadvantage in not having the Studies to assist him in the treatment of polymorphous groups in the genus, and consequently in failing to appreciate the salient features of the different species and to realise the extent of variation in their vegetative characters. My own investigation has been restricted by the quantity and condition of the available material, so the conclusions reached are mostly tentative. The following key to the species is in substitution for Rodway's, and the species are dealt with in their order as appearing in the key.

KEY TO THE SPECIES

1. Cilia imperfect, not appendiculate	curvicollum
Cilia appendiculate	2
2. Leaves with silvery points	argenteum
Leaves not silvery	3
3. Leaves distinctly bordered	4
Leaves without border	9
4. Leaves reddish, very obtuse; nerve failing below apex	blandum
Nerve percurrent or very shortly excurrent	laevigatum
Nerve excurrent in a hair-point or arista	5
5. Leaves soft, sometimes spirally twisted round the stem; nerve far excurrent	capillare
Leaves firm; arista stoutish, not markedly flexuose	6
6. Inflorescence usually synoicous	7
Inflorescence dioicous	8
7. Nerve usually shortly excurrent; leaves acute	pseudotriquetrum
Nerve rather long, cuspidate; leaves acuminate	affine
8. Leaves finely acuminate	caespiticium
Leaves wider and shortly pointed	Billardieri

9. Nerve percurrent or very shortly excurrent; leaves ovate-oblong and widely acute	10
Nerve far excurrent in an arista or cuspidate point; leaves lanceolate (except in <i>B. campylothecium</i>)	11
10. Leaves large, usually exceeding 2 mm. long, often much larger, not comose	<i>laevigatum</i>
Leaves much smaller; comose	<i>crassum</i>
11. Leaves small, 1.5 mm. long or less, lanceolate or ovate-lanceolate; ripe capsule tinted dark purple	12
Leaves larger, 2-3 mm. long, comose and imbricated, broadly obovate-oblong; ripe capsule brown	<i>campylothecium</i>
12. Capsule narrowly clavate; leaves yellowish; nerve golden	<i>chrysonuron</i>
Capsule turgidly elliptic or barrel-shaped	13
13. Capsule mostly constricted below the mouth; neck shortly tapered, not corrugated when ripe	<i>dichotomum</i>
Capsule like an acorn in its cup; neck corrugated, not tapered	<i>pachythea</i>

Bryum curvicolium Mitt. The main features here are the curved neck of the capsule and the more or less imperfect processes, the cilia only rarely being appendiculate. As Rodway correctly states, the capsule is not always conspicuously long or bent. The leaves are normally acute, with the nerve excurrent in a stout point, but those of the innovations are less sharply pointed, sometimes obtuse, and with the nerve often merely percurrent or even failing below the apex. In New Zealand this moss thrives on damp rock faces, and the capsule, usually dark coloured, makes it easily recognisable. The inflorescence is dioicous. *B. laevigatum* Broth. is probably best treated as a form of *B. curvicolium* which is a very variable species.

Bryum argenteum Hedw. The silvery shining tufts make this little moss unmistakable. It is cosmopolitan.

Bryum blandum H. f. & W. A distinct and handsome species, to be found in wet places, sometimes submerged. It often has an attractive vinous red tint. The leaves are of soft texture, very obtuse or almost rounded, with a slender nerve failing shortly below the apex. Rodway gives the leaf border in his key as being absent, and in the description as being ill-defined, but his specimens show a border which, though somewhat sporadic, is often quite distinct, as it is in the New Zealand race.

Bryum laevigatum H. f. & W. Characterised by the robust habit, brown or greenish brown colour, and firm leaves imbricated evenly along the stem and sometimes distinctly bordered. It is common in New Zealand in high country and is usually hygrophilous, frequenting wet stones in rivers, &c. I understand that it is rare in Australia.

Bryum capillare Hedw. Syn. *Bryum torquescens* Br. & Schimp., *Bryum obconicum* Hornsch., *Bryum pyrothecium* Hpe. & C.M. The leaves here are lax and of soft texture, contracted and twisted when dry, often spirally twisted round the stem. They are bordered rather narrowly but distinctly, and the margin may be plane or recurved, entire or denticulate above. The nerve is far excurrent in a slender, flexuose, slightly denticulate arista. The seta is long, the capsule large and long, usually reddish, with the operculum red and shining. *B. torquescens* is a form with synoicous inflorescence, and there is no difference in habit though Rodway, in his key, separates them on that account. The leaf

texture in the present species is laxer and softer than it is in *B. pseudotriquetrum*, the cells are larger and the nerve further excurrent. Abnormal forms of *B. Billardieri* with a long excurrent nerve can be distinguished by the stouter habit, more comose stems and cells with firm walls.

Bryum pseudotriquetrum (Hedw.) Schwaegr. Syn. *Bryum bimum* Brid. The plants grow in tufts on wet earth, usually in swamps. The nerve is strong and only shortly excurrent, the leaves ovate-lanceolate or oblong-lanceolate, distinctly margined and shortly pointed. The cells are rather small above 40-60 μ long and 2-3 \times 1. The capsule is large and brown, not reddish as in the last species. *B. bimum* has been separated on account of its synoicous inflorescence, *B. pseudotriquetrum* being dioicous, but the distinction tends to break down.

Bryum affine Lindb. Syn. *Bryum tasmanicum* Hpe., *Bryum creberrimum* Tayl. This species differs from the last in the narrower and more finely acuminate leaves, with the nerve further excurrent. The Studies (p. 207) states confidently that *B. tasmanicum* is identical with *B. affine*, so it is clear that the plant described by Rodway under the former name cannot possibly belong there, the peristome for one thing being wrongly described. The Studies (pp. 207, 213) states that the true *B. creberrimum* is the present species, and that Wilson had also mistakenly treated *B. obconicum* (i.e., *B. capillare*) as that. Rodway's specimens of *B. creberrimum* are referable to *B. capillare* too.

Bryum caespiticium Hedw. This species is in Rodway's collection under other names, including *B. caespiticioides* C.M., but does not appear in his work, though it is given as a Tasmanian moss in Flora Tasmaniae. His description of *B. caespiticioides* seems to fit the present species well enough, but the Musci assigns *B. caespiticioides* to the section *Doliolidium*, to which *B. dichotomum* &c. belong, so apparently there has been some confusion as to Müller's species. Müller himself, in Genera Muscorum Frondosum, treats it as of the *Caespitibryum* section, i.e., as akin to *B. caespiticium*. That species occurs in New Zealand and Australia, and has a wide distribution in the northern hemisphere. The leaves are rather small, 1-3 mm. long, crowded in comal tufts, oblong-lanceolate and narrowly acuminate, scarcely altered when dry, with the margins revolute and unbordered and the nerve far excurrent in a long arista. The cells are firm and rather narrow. The capsule is brown, clavate or oblong-pyriform, the peristome large and well developed, the spores 12-14 μ . It is a dioicous species, usually found in dry surroundings.

Bryum Billardieri Schwaegr. The following species recognised and described by Rodway cluster round *B. Billardieri*, which is the earliest publication, and with it form a most troublesome polymorphous group:—*B. breviramulosum* Hpe., *B. leptothecium* Tayl., *B. microrhodon* C.M., *B. rufescens* and *B. pyrothecium* Hpe. & CM. In addition to these, the Mascarene *B. truncorum* Brid. is treated in Hooker's Handbook and the Studies as being an Australasian moss. All the plants are characterised by the stout stems which are either comose, sometimes interruptedly so, or have the leaves more evenly arranged along them. The leaves when moist are either suberect or rosulately spreading, in shape oblong-ovate, oblong-obovate or oblong-spatulate, bordered either weakly or strongly with varying numbers of rows of narrow incrassate cells, toothed in

the upper part and with the margins recurved below. The nerve is excurrent in a short, recurved, slightly toothed point, but very occasionally this arista is greatly lengthened. The cells are firm-walled, rather small, rhomboid-hexagonal, the capsule clavate or narrowly oblong-pyriform, the inflorescence dioicous. The various species have been set up mostly on the degree of development of the border, combined with differences in habit and in the shape of the leaves. Extreme states in any of these directions are distinct enough, but there is no doubt that throughout Australasia there is a bewildering host of intermediate forms that resist systematic treatment. My inclination is to delimit *B. Billardieri* and *B. truncorum* by separating the plants into two groups where, in the case of the former species, the leaves are more or less evenly arranged round the stem, have a tendency to be ovate or oblong, and have the border narrow and often indistinct; and where, in the case of the latter species, the leaves are obovate or almost spatulate, often gathered together in comose rosulate heads, and are strongly and widely bordered. This is the treatment proposed by Dixon in the Studies. Mr. Willis informs me that the locality "Novo Belgio" given for the type collection of *B. Billardieri* must refer to Tasmania, and that the plant would have been collected near Hobart. The Studies, when describing this type specimen, mentions that the cells of the leaves of the sterile branches are larger than those in the leaves of the fertile branches. I have noticed the same thing in a specimen of *B. breviramulosum* in Rodway's collection, from Huon Road, and no doubt this variation is responsible for Rodway's statement that the cells in that species are smaller than in *B. Billardieri*, but that in some specimens they are rather large. The problem is made no easier by the fact that now and then a form is met with where the nerve is very far excurrent in an arista resembling that of *B. campylothecium*. From what I have seen of the New Zealand plants in the field I think that forms growing in arid surroundings tend to have the leaves densely imbricated into comose heads, and that forms growing in pasture have the stems more regularly foliate. Plants of the forest floor usually have the leaves green, comose and rosulate, spreading widely when moist. Some of the plants met with may therefore be conditioned, wholly or partly, by the environment. They are mesophytes and are seldom found in wet places.

Bryum crassum H. f. & W. In this rather small species the leaves are densely comose, interruptedly so on the longer stems, closely imbricated and little altered when dry. They are ovate-oblong and widely acute, practically unbordered and usually entire. The nerve is percurrent or shortly excurrent. The cells are small and strongly incrassate, with rounded angles. The capsule is brown, the neck short and rapidly narrowed to the seta. It is a very well marked species that occurs in New Zealand and has been collected recently at Canberra, Australia.

Bryum campylothecium Tayl. The affinity here is with *Bryum Billardieri* &c., of which it has the same firm areolation and size of cells, but there is no noticeable border, the marginal cells being almost undifferentiated. The margins are recurved, entire or slightly denticulate above. The nerve is excurrent in a very long arista. The leaves are closely imbricated into dense comose tufts, practically unaltered when dry. From

Rodway's description the capsule in the Tasmanian race is appreciably longer than it is in the New Zealand plant. His key would imply that the arista is normally short, though the description states that there is variability. I have not seen it anything but decidedly long.

Bryum chryseuron C.M. Syn. *Bryum erythrocarpoides* Hpe. & C.M. The above synonym is given in the Studies. Rodway states that the capsule there is brown, but it is a deep purple-red in *B. chryseuron* and this is an important diagnostic feature. It is narrowly clavate. The narrowly oblong-Panceolate leaves are of rather soft texture, unbordered and slightly denticulate above or entire. The nerve is golden-yellow or pink, excurrent in a cuspidate point. The seta is sometimes inordinately long in the New Zealand plant. The inflorescence is dioicous. The colouring of the nerve and capsule is the best guide to this species. It is closely related to the northern *B. erythrocarpum* Schwaegr., and as I have found in one of Rodway's specimens the crimson gemmae which are a specific character in the northern moss the relationship is shown to be closer still.

Bryum dichotomum Hedw. Syn.?? *Bryum ovicarpum* Broth., *Bryum cupulatum* C.M., *Bryum subcupulatum* C.M. I have seen too little of the species in the above synonymy to do more than suggest that they are probably conspecific with this. Rodway has reduced *B. pachytheca* to *B. dichotomum*, but they are usually kept separate owing to the capsule shape. In the present species the capsule has a short neck tapering to the seta, and more often than not there is a decided constriction below the mouth, making the capsule urceolate. In *B. pachytheca* the capsule base is enlarged and rugose, not at all tapered. In Rodway's key the vegetative characters are given as separating several species of this group, but in *B. dichotomum* there is such a wide range of variation in the shape of the leaf and the degree of excurrent of the nerve that no reliance can be placed on these differences.

Bryum pachytheca C.M. Syn. *Bryum gambierense* C.M., *Bryum argillicola* Broth.?? In *B. gambierense* the capsule is considerably longer than is usual in *B. pachytheca*, but it has the steep base of that in the present species and can only be treated as a form. Rodway's only specimen of *B. argillicola* has a single capsule which seems to be of *pachytheca* shape. *Bryum Sullivani* C.M. appears to be intermediate between *B. dichotomum* and *B. pachytheca* though perhaps nearer the latter. The shape of the capsule is really not typical of either.

Doubtful species.

Bryum rubiginosum H. f. & W. There is no specimen of this in the collection, but barren material is reported in Flora Tasmaniae. The Musci cites it as a Tasmanian moss of the section *Leucodontium*, but since no fertile plants have been seen I think that the record should be considered as doubtful in the meantime. No representative of the section has been reported in New Zealand.

Bryum microsporum Broth. Brotherus, in the Musci, includes this in a section of the *B. capillare* group. The specimen in Rodway's collection could be *B. capillare* itself, the leaf agreeing with that species; but the material is very scanty.

Bryum intermedium Brid. Dixon, in the Studies states that this species occurs in Tasmania, but he gives no particulars. Rodway mentions Colebrook as a locality and a named specimen in the herbarium is from there, but it cannot be this species because it has not got the synoicous inflorescence and large spores of *B. intermedium*. I should think that it is probably a form of *B. caespiticium*.

Bryum sp. There are two specimens in the collection from Meander River sub nom. *B. laevigatum* Broth., and Rodway's description of that species seems to be intended to apply to the plants in question. The Studies suggests that *B. laevigatum* is a form of *B. curvicolium* Mitt. with abnormally small spores, and from what I have seen of the original material, which is from New Zealand, I have little doubt that this view is correct. Rodway's specimens differ, however, in the distinctly bordered leaves, and may represent a new species. The spores are larger than in *B. laevigatum*.

7. *Leptostomum* R. Br.

In his paper on this genus (*The Family Leptostomaceae*, the Bryologist, 54 : 217) Andrews arrives at the conclusion that the affinity of *Leptostomum* is with the Bryaceae, and that its most closely related genus is *Brachymenium*, where too the peristome is reduced, though not to the same extent as in *Leptostomum*. The leaf cells in this genus are short and isodiametrical, but I have found that in *L. macrocarpum* the lower rudimentary leaves sometimes have the areolation of typically bryoid nature, and Andrews agrees with me that this supports his view of the relationship. In the Studies *L. gracile* is united with *L. inclinans* which has page priority in publication. Neither *L. macrocarpum* (Hedw.) R. Br. nor *L. Menziesii* Hook. can at present be considered as a Tasmanian moss.

Footnote to Notes on Tasmanian Mosses from Rodway's Herbarium: IV.

Mnium longirostrum. I find that the specimen cited by Weymouth and Rodway as being this species consists of a mixture of *Pterygophyllum dentatum* (H. f. & W.) Mitt. and *Distichophyllum pulchellum* (H. f. & W.) Mitt. So far, therefore, as the material in Rodway's collection is concerned the record must be treated as incorrect.

