

## Notes on Tasmanian Mosses from Rodway's Herbarium: III

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## Family GRIMMIACEAE

Of the eight genera included by Rodway in this family only three, *Grimmia*, *Rhacomitrium* and *Glyphomitrium*, are now usually recognised as belonging here. The others are referable to Orthotrichaceae, and of the three species given by Rodway for *Glyphomitrium* one, *G. latifolium* Broth., is admitted by its author to be *Tridontium tasmanicum*, and the others are now included in the genus *Ptychomitrium*. Mosses belonging to Grimmiaceae are usually tufted and rupestral, with strongly hygroscopic leaves which are hyaline-tipped and which have sinuose walls. The seta is often arcuate and the peristome is single.

*Grimmia* Hedw. In this genus the stems are shorter and less branched than in *Rhacomitrium* and the teeth are not, or only slightly, divided. The plants usually form dense cushions on rock.

*Grimmia apocarpa* Hedw. Syn. *Grimmia mutica* Hpe. The Tasmanian race of this very widely distributed species shares with the New Zealand form the peculiarity that the columella does not constantly fall with the lid, this constituting a deviation from one of the specific characters. The development of the short hair-point is so variable that completely epilose forms hardly deserve any distinctive rank. This is the only Tasmanian species so far known that has the capsule immersed in the perichaetial leaves. The cells in midleaf, but only there, are often slightly sinuose.

*Grimmia pulvinata* (Hedw.) Sm. Syn. *Grimmia cygnicolla* Tayl. This species differs from the next in the darker colour, wider leaves, shorter basal cells and autoicous inflorescence. The operculum is variable in the shape of its beak, and plants having it shortly and bluntly beaked are referable to the var. *africana* (Hedw.) Dix. This is the usual New Zealand form. The leaves have long hyaline points which give the cushions a hoary appearance. There are a few specimens in the collection named *G. tasmanica* C.M., but this species is not kept up in Rodway's work as distinct from *G. pulvinata* and I have no doubt that it is valueless.

*Grimmia trichophylla* Grev. This is distinguishable from the last by the characters mentioned. The inner basal cells are narrowly rectangular, but those at the margin are usually shortened and widened.

*Grimmia laevigata* (Brid.) Brid. Syn. *Grimmia campestris* Burch.; *Grimmia leiocarpa* Tayl. The broadly triangular-ovate leaves, bistratose above and with plane margins, the wide rough hyaline points, and the wide thin nerve which falls below the apex, are strong gametophytic characters. The hoary cushions fall to pieces readily.

*Grimmia ovalis* (Hedw.) Lindb. According to Geneva Sayers (*The Bryologist*, 54 : 91) *G. commutata* Hueb. should be treated as a synonym of this species. It has not hitherto been recorded in Australasia but it occurs, though rarely, in South Africa. In Rodway's collection there is a specimen, sub nom. *G. leiocarpa*, from Huon Road, "Hill near Fern Tree", which, though in immature fruit, can probably be referred here. It is quite distinct from any other Australasian species in the deeply concave lanceolate leaves, with plane margins and a long, stout, slightly denticulate hair-point. The nerve, though rather narrow, is distinct. The upper cells are obscure, bistratose, rounded and incrassate; the basal ones elongated, incrassate and slightly sinuose, with a conspicuous marginal band of numerous (8-10) rows of shortened and widened hyaline cells. It is to be hoped that further findings will clarify the plant's position.

*Rhacomitrium* Brid.

*Rhacomitrium crispulum* (H. f. & W.) H. f. & W. Syn. *Rhacomitrium symphyodon* Mitt. Rodway's statement that the leaf cells here are coarsely papillose and that the lower ones are without sinuose walls shows that he did not know this species, because the cells are smooth and those below have the walls extremely sinuose, i.e., nodulose. The *Studies* reduces *R. symphyodon* to synonymy and does not recognize the boreal *R. heterostichum* (Hedw.) Brid. as a Tasmanian or New Zealand moss, but treats the plants which had been included in it as referable to the present species. *R. rupestre* H. f. & W. is there reduced to a variety of *R. crispulum*. Although Rodway's herbarium contains plants that show an approach to the variety, as described in the *Studies*, I have not seen anything that is referable there with certainty. *R. crispulum* is almost always rupestral and appears to be as common in Tasmania as it is in New Zealand. It is very variable in habit, colour, &c.

*Rhacomitrium lanuginosum* (Hedw.) Brid. var. *pruinatum* H. f. & W. Syn. *Rhacomitrium pruinatum* C.M. *Rhacomitrium hypnoides* (Hedw.) Lindb. var. *pruinatum* H. f. & W. In one form or another this must be the commonest bipolar moss in the world. In New Zealand it is often, perhaps usually, terrestrial, but elsewhere its substrate appears to be rock. The diaphanous leaf-tip and hair-point, dentate and papillose, are distinctive and beautiful. The rough seta is unique in the genus. I have no information as to the frequency of fruit in the Tasmanian plant. In New Zealand fertile plants are extremely rare.

*Ptychomitrium* Fürnr. The position of this genus is not unanimously settled. The Musci, followed by Dixon in his *Classification of Mosses* (Manual of Bryology), places it in a separate family, Ptychomitriaceae, next to Orthotrichaceae. The plants differ from those of *Grimmia* in having the leaves without hair-points and the leaf cells without sinuose walls.

*Ptychomitrium Mittenii* Jaeg. Syn. *Glyphomitrium serratum* Mitt. This is amply distinct from the next in the leaves being strongly serrated above. It occurs in Australia but has not been reported from New Zealand.

*Ptychomitrium acutifolium* H. f. & W. Syn. *Glyphomitrium acutifolium* Mitt. This is a much smaller plant than the preceding, with a habit recalling that of *Weissia controversa*, with entire leaf margins

which are nearly plane and not revolute as described by Rodway. I have not found any obvious differences between this and small forms of the Australian and New Zealand *P. australe* (Hampe) Jaeg., and from what I have seen of the plants I am doubtful whether in this genus the relative lengths of calyptra and capsule are as firm a character as might be supposed from the divisions given in the Musci.

#### Family ORTHOTRICHACEAE

As in Grimmiaceae, the leaves here are hygroscopic, but they have no hyaline tip. The cells are often papillose and their walls are not sinuose. The peristome is normally double, but it is sometimes single or even lacking. The habit of the plants varies; in some genera (e.g., *Macromitrium*) the stems creep and emit many short branches, whilst in others (e.g., *Orthotrichum*) they are usually erect and sparingly branched.

*Orthotrichum* Hedw. The boundary between *Orthotrichum* and *Ulota* is indistinct, the two genera being kept apart more as a matter of practical convenience than on account of any very marked differences. Nevertheless, it is possible to separate the Tasmanian species of the present genus by the stomata being situated in the central or upper part of the capsule and by the inner cells of the leaf base being scarcely incrassate and little differentiated from the outer cells; whereas in *Ulota* the stomata are confined to the base of the capsule and the basal leaf cells are strongly incrassate and lengthened, and the outer cells (in several rows) are short, wide and hyaline, forming a conspicuous border. In both genera there is a well developed outer peristome of 16 teeth, often united in pairs, combined with more or less rudimentary processes which form the inner peristome. The three local species of *Orthotrichum* have the stomata superficial. It is more than likely that future collections will substantially increase the number of Tasmanian species.

*Orthotrichum tasmanicum* H. f. & W. Syn. *Orthotrichum laticiliatum* Vent. & Broth. This differs from the other species in the comparatively long seta which raises the capsule well above the perichaetial leaves. Rodway describes the leaf margin as revolute, but this is not constant in the species which is altogether extremely variable. The leaf cells may be papillose or almost smooth, the calyptra slightly hairy or smooth and the capsule ribbed or smooth. In the New Zealand race the seta is often greatly shortened so that the capsule is then almost immersed. I adopt Dixon's view (Studies, 175) that *O. laticiliatum* is not distinguishable.

*Orthotrichum lawrencii* Mitt. The affinity here is with *O. tasmanicum*, but the basal leaf cells are not much longer than the upper ones, as they are there, and the processes are wider and coarsely papillose. The capsule scarcely exceeds the perichaetial leaves. The locality of Gunn's original finding is not specified, and there has been no further collection.

*Orthotrichum rupestre* Schleich. This northern species is not mentioned by Rodway, but there is a specimen so-named in his herbarium, collected by him at Kangaroo Valley, which appears to be referable here. It differs from the foregoing in the immersed capsules, the broadly lanceolate leaves with margins regularly revolute to near the apex, and in the strongly papillose cells. In *O. rupestre* the inner peristome is

either wanting or rudimentary. The relationship between the northern plant and the New Zealand *O. pulvinatum* R. Br. ter. requires clarification, and further collections of the Tasmanian plant are much to be desired.

*Ulota* Brid.

There has been a modern and authoritative revision of the Australasian species of this genus by the late N. Malta (*A Survey of the Australasian Species of Ulota*, Act. Hort. Bot. Univ. Latv. VII, 1933), and as a result a total of six species is still recognised as Tasmanian, but three of Rodway's are omitted and replaced by new species. Students of the group will find the revision indispensable, and the following brief notice is merely intended to give the salient features by which the species can be recognised.

*Ulota lutea* Mitt. Syn. *Ulota Weymouthii* Vent.; *Orthotrichum crispum* Hedw. A marked character here is the leaf's "waist" which is formed by recurvature of the margins on both sides for a short distance immediately above the widened base. It is nearly always exhibited in some of the leaves. *U. crispa* (Hedw.) Brid., a northern species, is not given by Rodway for Tasmania but appears in the Flora Tasmaniae as *Orthotrichum crispum*. Malta considers both it and *U. Weymouthii* to be identical with the present species. He mentions that some of the plants hitherto referred to *U. fulva* Brid. belong to *U. lutea*, and that the former plant is confined to the Madagascar region and does not occur in Australasia.

*Ulota laticiliata* Malta. There is a close resemblance here to *U. lutea*, but the leaf margins are almost plane and the processes of the peristome are wide and often with a zigzag median line instead of being linear-lanceolate, as there. In both the leaves are strongly crisped when dry. *U. laticiliata* is widely distributed in New Zealand.

*Ulota cochleata* Vent. This is a Tasmanian endemic. It differs from the other species in having the stomata in the middle of the capsule. Rodway describes the leaves as partially crisped when dry, but Malta states that they are strongly twisted. He describes the processes as being filiform and knotted.

*Ulota membranata* Malta. This species is recognisable at once by the enormous spores which measure up to 90  $\mu$  in diameter, and which are sometimes multicellular. The capsule shape, too, is distinctive, it being almost pyriform. Another interesting fruiting character is the irregular praeperistome. *U. membranata* also occurs in New Zealand and is fairly common there on subalpine scrub.

*Ulota Dixonii* Malta. This and the following differ from the other species in the creeping habit and in the leaves being only very slightly twisted when dry. They also have in common a yellow-bordered operculum; but the present plant is more robust, with larger leaves that are gradually tapered from an oblong base, whilst in *U. viridis* they are narrowed more abruptly from a rotund or shortly oval base. The spores in the present species are verruculose, whereas in *U. viridis* they are finely papillose. *U. Dixonii* is endemic, but I have seen a New Zealand plant that is closely related and may possibly be a variety.

*Ulota viridis* Vent. Syn. *Ulota anceps* Vent. The distribution here is confined to Tasmania and New Zealand. Malta considers that *U. anceps* is only a robust form. *U. viridis*, as its epithet implies, has a green tint, and this, with the slender creeping habit and leaves appressed and but little altered when dry, makes it easy to recognise.

*Macromitrium* Brid.

Rodway's account of the species of *Macromitrium* shows that there has been considerable misunderstanding as to the identity of some of the species. The material that I have seen is scanty and imperfect, and though in some cases it includes part of the actual type, this does not compensate for the lack of adequate specimens in good condition, which alone can enable satisfactory conclusions to be reached in such a difficult genus. The following treatment is purely tentative and aims at doing little more than clearing the ground for future investigators.

*Macromitrium asperulum* Mitt. and *Macromitrium Archeri* Mitt. it will be noted that these two, as well as three other, species are given by Rodway as having papillose leaf cells, glabrous calyptras and gymnostomous capsules, an invitation surely for a close scrutiny! Through the courtesy of Dr. Rogers of the New York Botanical Gardens I have examined part of the type gatherings of these two species from Mitten's herbarium. In *M. asperulum* the leaves tend to be narrower and longer, being ligulate from a slightly widened base, whilst in *M. Archeri* the leaves are lanceolate and the base wider. Nevertheless, the differences are rather elusive. In both the leaf margin is more or less crenulate by projection of the cells which are variably papillose. This condition, which is described by Mitten as "erose", is more marked in *M. asperulum*, the name of which refers to this rough appearance of the leaf edge. In a footnote to the species in the Flora Tasmaniae Mitten mentions the erose leaf margin as a separating character from *M. Archeri*, but his Tasmanian specimen of *M. asperulum* has the leaf margin often scarcely crenulate, and moreover his diagnosis of *M. Archeri* describes the margin there as "minutissime eroso". Apparently then the difference here is only one of degree. Mitten states that the dry leaves in *M. asperulum* are incurved and that those in *M. Archeri* are twisted and subcrispate, but my impression is that in both type plants the leaf habit is the same, i.e., more or less crisped when dry. The two appear to agree in having a smooth calyptra and gymnostomous capsule, assuming that Rodway's statement concerning the latter is correct. The Studies gives *M. asperulum* as a synonym of *M. ligulare* Mitt., but the latter species appears to differ in the peristomate capsule and in the areolation of the leaf. New Zealand specimens which have been referred to *M. asperulum* are probably forms of *M. erosulum* Mitt. or *M. prorepens* (Hook.) Schwaegr. If *M. Archeri* and *M. asperulum* are to be united then the customary page priority would favour the former as the name.

*Macromitrium pusillum* Mitt. This is a difficult plant, owing to the imperfect condition of the few available specimens. The type collection was made "on stones; Cataract Hill". Mitten's diagnosis gives the calyptra as glabrous (and the material confirms this), but is silent as to the peristome which Rodway states is wanting. Mitten describes the dry leaves as spirally twisted, but I have not seen them strikingly so.

His specimen, and another from Circular Head determined by Brotherus, confirm his statement that the leaf edge is entire, lacking the crenulation which characterises the foregoing species. Otherwise the aerolation is much as it is in them, but the cells are only slightly papillose. The branches are very short and my specimens give the impression that they may be stunted plants. The Studies gives *M. pusillum* as a New Zealand moss, but there is no doubt that the plants which have been referred there really belong to *M. ligulare* Mitt. and that *M. pusillum* has as yet not been reported from New Zealand.

*Macromitrium microstomum* Schwaegr. In the note to *M. asperulum* in Flora Tasmaniae it is explained that owing to a confusion of specimens in Hooker's herbarium examples of *M. asperulum* have been referred to *M. microstomum*, a totally different species which is allied to the East Indian *M. Reinwardti* Schwaegr. This accounts for the fact that in Rodway's work, and in his herbarium, specimens of what is probably *M. asperulum* have been wrongly described and determined as *M. microstomum*. The same observation applies to what Rodway has taken to be *M. Weymouthii* Broth., but the error in this case must have arisen through a mixture of mosses sent in a folder from Rodway to Brotherus, which I have seen from the latter's herbarium, and which contains a small portion of the true *M. Weymouthii* together with what is probably *M. asperulum*. The only examples of the true *M. Weymouthii* in Rodway's collection appear there sub nom. *M. tasmanicum* Broth., and his description of the latter species is a fairly adequate account of *M. Weymouthii*, except for the fact that the capsule is peristomate as Rodway's own specimens show. Mosses of the *M. Weymouthii* group are quite distinct from those of *M. asperulum* affinity in the small strongly incrassate leaf cells which are smooth, or almost so, throughout, and in the entire leaf margin, quite without crenulation. The relationship between *M. Reinwardti*, *M. microstomum* and *M. Weymouthii*, which all belong to the same group, is by no means clear to me. According to Fleischer's Musci von Buitenzorg *M. Reinwardti* occurs in Tasmania, and this statement is also made in the Flora Tasmaniae. That might have been Fleischer's only source of information, but in any event his description of that species applies so well in many respects to *M. Weymouthii* that the possibility of their being conspecific suggests itself. Dixon, in the Studies (p. 187), observes that all the so-named specimens of *M. microstomum* at Kew belong to *M. Weymouthii*, and from this remark it seems possible that he did not appreciate the close relationship between the two species. I have examined a few leaves of the type gathering of *M. microstomum* from Greville's herbarium, and find that the aerolation is much the same as in *M. Weymouthii* though the leaves are more finely pointed in Greville's moss. If further research establishes that the three mosses concerned are conspecific then *M. Reinwardti*, as the earliest publication, would be the valid name. In my opinion *M. tasmanicum* is certainly the same moss as *M. Weymouthii* whatever the correct name of the latter should be.

*Macromitrium longirostre* (Hook.) Schwaegr. This has a distinct habit when dry, the leaves being somewhat spirally twisted round the stem with the points rigidly projecting, giving the stems a bristly appearance. The leaves are lanceolate, sharply pointed, with smooth

cells. The elongate, narrow, sulcate capsule is also distinctive. *M. Rodwayi* Dixon, which was published by Weymouth and Rodway subsequently to Rodway's main work (*Papers & Proc. &c.*, 1921), seems to me to have much in common with the present species, but differs somewhat in the habit, the dry stems not being bristly. *M. Rodwayi* was collected at Port Arthur on maritime rock, the usual station for *M. longirostre* in New Zealand, but the latter species is probably corticolous in Tasmania and often so in the Campbell Islands group.

*Macromitrium eucalyptorum* Hpe. & C.M. The slender habit and the leaves appressed and strict when dry characterise this species very distinctly. Rodway's key states that the calyptra here is smooth, whilst in *M. microphyllum* Hook. & Grev. it is hairy. This is an error, because normally the calyptra in *M. eucalyptorum* is densely hairy but, at any rate in the New Zealand plant, the character is variable and sometimes the organ is almost smooth. *M. microphyllum* is a South African species and Sim, in the Bryophyta of South Africa, treats it as a form of *M. tenue* (H. & G.) Brid.; but whatever may be the true relationship between the Australasian and South African plant it seems clear that the only recognised Australasian species of the group is *M. eucalyptorum*.

*Zygodon* Hook. & Tayl.

Malta has revised this genus in a very valuable work (*Die Gattung Zygodon Hook. & Tayl.*; Lat. Univ. Bot., Riga, 1926), and has divided the species into three subgenera as follows:—*Bryoides* Malta where the leaf cells are smooth and to which *Z. Menziesii* and *Z. minutus* belong; *Euzygodon* C.M. where the leaves are acute and the cells more or less papillose and which includes *Z. intermedius* and *Z. Hookeri*, and *Obtusifolius* Malta where the leaf apex is rounded and the cells are papillose. All the Tasmanian species, and two others, occur in New Zealand.

*Zygodon intermedius* B. & S. Syn. *Zygodon Brownii* Schwaegr. Malta found that in this species, which has a wide distribution in the southern hemisphere, the Australasian plants show a gradual transition from double to single peristome, and that *Z. Brownii* cannot be considered as distinct merely on account of its double peristome. The capsules in *Z. intermedius* are indeed sometimes gymnostomous and the cilia are usually fugaceous. Rodway's collection contains a barren specimen from Colebrook which is labelled as this species but which is an *Anoectangium*, and is in all probability the same as the New Zealand *A. Bellii* Broth.

*Zygodon Hookeri* Hpe. Syn. *Zygodon anomolus* D. & M. Malta has shown that *Z. anomolus* is invalid in that the material consists of a mixture, and that the plants usually referred to it belong to *Z. Hookeri*. In his view this species is a subspecies of *Z. Reinwardtii* (Hornsch) Al. Br. In the latter, which is an East Indian and South American moss, the leaves are spinulose-denticulate at the apex and the inflorescence is polygamous, whereas in *Z. Hookeri* the leaves are nearly entire and the inflorescence is synoicous. This distinction, admittedly rather slight, is made in the Studies. Rodway's description of *Z. Reinwardtii* as having entire leaves is incorrect, and that species, at any rate in its typical form, must be excluded from the Tasmanian flora. In both species the leaf margin is undulate, but I have not found this to be constant in the New

Zealand plants. As might be inferred from the foregoing, the present species is not always easily separable from *Z. intermedius*, but as a rule the longer leaves, showing here and there a few spinose teeth, and the presence of antheridia at the base of the vaginula, will serve to place *Z. Hookeri*.

*Zygodon obtusifolius* Hook. The rounded leaf apex, coarsely papillose cells and short nerve make this a very distinct species. Its absence from the East Indies and Australia is interesting and puzzling in view of its distribution in Tasmania, New Zealand, central and south America, India and Ceylon. Malta reports the curious fact that some plants from New Zealand and Venezuela have the leaf apex subacute.

*Zygodon Menziesii* (Schwaegr.) W. Arn. This species is characterised by the oblong leaves, incurved and twisted when dry, with margins reflexed to above midleaf. The nerve usually fails below the apex, but occasionally it is percurrent or even shortly excurrent. The smooth cells are arranged in regular rows ascending obliquely from nerve to margin. The peristome is double and persistent.

*Zygodon minutus* C.M. & Hpe. Rodway states that this is not present in any available collection, but Malta refers to a Tasmanian finding by Gunn which he has studied. The original gathering was made in Australia. *Z. minutus* differs from *Z. Menziesii* in the leaves being more sharply pointed, with plane margins and an excurrent nerve. It is a smaller plant but is obviously closely related and has a similar double peristome.

*Amphidium* (Nees.) Schimp.

Brotherus and Malta have favoured treating this genus as of the family Dicranaceae, but other authors assign it to Orthotrichaceae and separate it from *Zygodon* by the almost immersed gymnostomous capsule.

*Amphidium cyathicarpum* (Mont.) Broth. This moss grows in soft tufts on damp shaded rock, and is easily recognisable by the crisped leaves and scarcely exerted, wide-mouthed, deeply grooved capsule. In the New Zealand race the leaf margin is usually entire, but some remote denticulation is considered to be a specific character and, according to Rodway's description and my own observations, it is exhibited in the Tasmanian plant. When barren this species is not always easy to separate from *Anoetangium Bellii*, but in the latter the nerve is rough at the back, the leaf margin is always entire, and the nerve in section has the guide cells ventral and not median as they are in *Amphidium*. When in fruit the *Anoetangium* is distinguishable at once by the long seta.