



FLORA OF NEW ZEALAND
MOSSES

MEESIACEAE



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Cover image: *Meesia uliginosa*, habit with capsule. Drawn by Rebecca Wagstaff from *B.H. Macmillan* 73/235, CHR 164922.

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Introduction

The Meesiaceae are a small family of mosses traditionally considered to include three predominantly northern hemisphere genera. The genus *Meesia* was initially recorded from New Zealand in 1867 in Hooker's *Handbook of the New Zealand Flora*. In subsequent decades, the name most often applied to N.Z. material has been *M. muelleri* Müll.Hal. & Hampe, based on an Australian (Victorian) type. Inexplicably, several other names in *Meesia* have been published, using both Australian and N.Z. type specimens. All N.Z. material of *Meesia* is here referred to *M. uliginosa* Hedw. This species is widespread, with a predominantly northern hemisphere distribution, and has several Australasian heterotypic synonyms, including *M. muelleri*. *Meesia uliginosa* is widely distributed on the South I., where it occurs on wet humic soil in mineral-rich sites, mostly at mid to high elevations. It sometimes dominates areas several square metres in extent, and can be very conspicuous due to its extremely long setae and elongate suberect capsules. On Chatham I. it is known only from one collection, and it remains unrecorded from the North I. *Meesia uliginosa* appears to be an indigenous plant in N.Z.

The concept of the Meesiaceae has recently been broadened, mostly using molecular evidence, to accommodate the cosmopolitan and often weedy moss *Leptobryum pyriforme*. This species is widespread on the two main islands and also occurs on Chatham I. It mainly grows on damp soil or humus, in swamps, marshes, or disturbed habitats such as drainage ditches and roadside banks at lower elevations. It is also abundant on potting mix in glasshouses and similar situations, and is often considered to be a nuisance by horticulturalists. It is likely that some or even all populations of *L. pyriforme* are adventive in N.Z.

Typification

The following lectotypifications are made in accordance with the International Code of Nomenclature for Plants, Algae and Fungi.

***Meesia aquatilis* R.Br.bis., Trans. & Proc. New Zealand Inst. 31: 465 (1899)**

Lectotype (designated here): N.Z., Canterbury, Broken River., *R. Brown* 246, CHR 335682!
Isolectotype (designated here): BM-Dixon!

***Meesia buchananii* R.Br.bis., Trans. & Proc. New Zealand Inst. 31: 464 (1899)**

Lectotype (designated here): N.Z., Canterbury, Port Lyttelton Hills, Kennedy's Bush, Jan. 1882, *R. Brown s.n.*, CHR 335684! Isolectotype (designated here): BM-Dixon!

***Meesia kirkii* R.Br.bis., Trans. & Proc. New Zealand Inst. 31: 463 (1899)**

Lectotype (designated here): N.Z., Southland, near Lake Te Ānau, *R. Brown* 245, CHR 335685!
Isolectotype (designated here): BM-Dixon!

Meesiaceae

Plants medium-sized to ± robust, erect, dull or weakly glossy, often dark brown or nearly black below, forming turves. **Stems** erect, sparsely branched by innovation or forking, densely or sparsely covered with dark, papillose rhizoids, in cross-section with a distinct central strand. **Leaves** erect, erect-spreading, or widely squarrose, with an erect base, often distinctly ranked in 3 to many rows, uniformly spaced and sized or less often crowded and larger in an apical coma (in *Leptobryum*), ovate-lanceolate, obovate, or lanceolate-subulate (in *Leptobryum*), not or clearly decurrent, unbordered, mostly entire but sometimes toothed near apex; **upper laminal cells** variable in shape, smooth (in N.Z. taxa) or rarely mammillose, mostly firm- or thick-walled. **Costa** broad, ending below the apex or percurrent. **Axillary hairs** conspicuous, with 2–3 strongly pigmented basal cells. **Rhizoidal tubers** absent or present (in *Leptobryum*).

Sexuality variable. **Perichaetia** terminal, often appearing lateral due to innovation; **perichaetial leaves** longer than vegetative, enclosing sex organs and a few filamentous paraphyses. **Perigonial leaves** usually forming a disc, enclosing numerous clavate paraphyses (in *Meesia*). **Setae** elongate, thin, and often tortuous; **capsules** usually suberect, sometimes horizontal to pendulous (in *Leptobryum*), curved from a conspicuous and often elongate neck, asymmetric, elongate-pyriform; **stomata** numerous in the neck; **operculum** bluntly conic. **Peristome** double, highly variable; **exostome teeth** usually much shorter than endostome segments (in *Meesia*) or ± equal the endostome segments (in *Leptobryum*); **endostome** with a low or high basal membrane, with or without cilia. **Calyptra** cucullate and smooth. **Spores** spherical, variable in size and ornamentation.

Taxonomy: A family traditionally considered (Brotherus 1924) to consist of three predominantly northern hemisphere genera: *Meesia*, *Paludella*, and *Amblyodon* (the last two monotypic). Matteri & Ochyra (1999) reviewed the members of the family (three species in three genera) occurring in southern South America, while Bell & Catcheside (2006) treated the two species of *Meesia* recorded from eastern Australia. Goffinet et al. (2009) recognised five genera in the family, including *Leptobryum* (which has traditionally been treated in the Bryaceae) and the monotypic southern South American *Neomeesia*.

The placement of *Leptobryum* in this family by modern authors is based on the molecular evidence presented by Cox & Hedderson (1999). Counter arguments, in favour of retaining *Leptobryum* in the Bryaceae, are presented by Ochyra et al. (2008, p. 419).

The genera placed in Meesiaceae by Brotherus have often poorly developed exostome teeth, low endostomal basal membranes and rudimentary or no cilia. *Leptobryum*, by contrast, has essentially a perfect peristome with well-developed and lanceolate exostome teeth, a high endostomal basal membrane with well-developed segments and well-developed appendiculate cilia. By these and many other features (including costal anatomy and the nature of its laminal cells), *Leptobryum* is morphologically anomalous in this family. It is retained here because of Cox & Hedderson's molecular evidence that it belongs in a well-supported clade that includes *Meesia*, *Paludella*, and *Amblyodon*. This interpretation led to its inclusion in the Meesiaceae by Goffinet et al. (2009). *Leptobryum* is also placed in the Meesiaceae in Smith's (2004) British flora and in the classification utilised by the *Flora of Australia* vol. 51, which is based on Goffinet & Buck (2004).

- 1 **Leaves** larger and crowded in an apical coma, those on the lower stem wide-spreading, abruptly tapered from an erect and oblong base to a setaceous subula, acute, mostly 3.5–5.0 mm; costa nearly filling the upper lamina; **capsules** horizontal, inclined, or ± pendulous, with a well-defined and narrow neck c. 2 times the urn length; **exostome teeth** tall and well-developed; **endostomal membrane** high, giving rise to well-developed and perforate segments ± equal the length of the teeth, and with 3–4 well-developed, appendiculate cilia; **spores** 10–13 µm *Leptobryum*
- 1' **Leaves** evenly distributed on the stem, erect-spreading, oblong- or narrowly ovate-lanceolate, broadly rounded at apex, mostly 1.7–3.2 mm (in N.Z. representatives); **costa** not filling the upper lamina; **capsules** suberect and curved, with a well-defined neck ± equal to the urn; **exostome teeth** short, often fragile, truncate; **endostomal membrane** short and rudimentary, giving rise to narrowly linear segments 2–4 times the length of the teeth, and with short or rudimentary cilia; **spores** 45–54 µm *Meesia*

***Leptobryum* (Bruch & Schimp.) Wilson, *Bryol. Brit.*, 219 (1855)**

Type taxon: *Leptobryum pyriforme* (Hedw.) Wilson

Taxonomy: A small or monotypic genus with the features of *L. pyriforme*; two poorly known tropical South American species sometimes placed here have costae ending below the leaf apices and erect capsules.

Etymology: The generic name means “slender *Bryum*”.

***Leptobryum pyriforme* (Hedw.) Wilson, *Bryol. Brit.*, 219 (1855)**

≡ *Webera pyriformis* Hedw., *Sp. Musc. Frond.*, 169 (1801)

Type: Germany. Not seen.

Plants bright green, forming turves. **Stems** green when young, nearly black in older parts, to c. 20(–30) mm in sterile plants, mostly <10(–15) mm in fertile plants, unbranched (or rarely with subperichaetial innovations), beset at extreme base with finely papillose, red-brown rhizoids, in cross-section with a well-defined central strand and a single layer of firm-walled and elongate cortical cells. **Leaves** larger and crowded in an apical coma, those on lower stem wide-spreading, linear-lanceolate and c. 2 mm, those of coma abruptly tapered from an erect and oblong base to a setaceous and tubulose subula, acute, mostly 3.5–5.0 mm, bluntly denticulate near apex, strongly flexuose when dry; **laminal cells of subula** multistratose, linear, mostly c. 100 × 8–10 μm, thin-walled, smooth, not differentiated at margins; **basal laminal cells** unistratose, otherwise as those of subula. **Costa** filling c. ½ of base and nearly all of subula, percurrent, in cross-section (at mid subula) with large median guide cells and abaxial and adaxial substereid bands. **Rhizoidal tubers** present (sometimes in axils of lower leaves), ellipsoid or ± globose, brown or red-brown, 180–200 × c. 135 μm, mostly 2 cells wide, with individual cells to c. 100 μm across. **Axillary hairs** conspicuous under stereoscope, usually persistent on stem when leaves are removed, the lower cells quadrate and bright red-brown, the terminal cell elongate and hyaline.

Synoicous in N.Z. material. **Perichaetia** terminal, enclosing both red-brown axillary hairs and hyaline filiform paraphyses. **Setae** 18–50 mm, red-brown throughout, erect; **capsules** horizontal, inclined, or ± pendulous, narrowly pyriform, 2.0–2.5 mm, brown or straw-coloured, lustrous, with a well-defined and narrow neck c. 2 times the urn length; **mouth** narrowed and transverse; **stomata** numerous, restricted to neck; **annulus** revoluble; **operculum** bluntly conic. **Exostome teeth** well-developed, lanceolate, pale, densely papillose, trabeculate; **endostome** from a high basal membrane, with well-developed perforate segments ± the height of the teeth, and with 3(–4) appendiculate cilia. **Calyptra** cucullate and smooth. **Spores** 10–13 μm, spherical, nearly smooth.

Illustrations: Plate 1. Crum & Anderson 1981, fig. 247; Eddy 1996, fig. 442; Smith 2004, fig. 171, 13–17; Ochyra et al. 2008, fig. 188.

Distribution: NI: N Auckland (Cape Maria van Diemen, Kaitāia, Tī Point, Epsom), S Auckland, Hawke’s Bay (Ōpoutama, Nūhaka), Wellington (Ohakune, north-west Ruahine Range, Hōkio Beach); SI: Nelson (no locality), Canterbury, Westland (Kellys Creek), Otago, Southland (Awarua); Ch. Also occurring throughout as an abundant glasshouse weed.

Nearly cosmopolitan and possibly adventive. Widespread in temperate and colder regions of both northern and southern hemispheres; also recorded from scattered tropical localities (Crum & Anderson 1981).

Habitat: On damp soil or humus, often in swamps, marshes, or damp, disturbed habitats such as drainage ditches, roadside banks. Occasionally on pockets of soil over rock (especially limestone). From sea level to at least 700 m elevation. Also occurring abundantly on potting-mix in glasshouses and in similar artificial situations.

Recognition: The pale, strongly lustrous, and narrowly pyriform capsules with elongate necks, together with the leaf form of this species, are highly distinctive. Despite their being placed in the same family, *Leptobryum* and *Meesia* seem unlikely to be confused. Given its well-developed bryoid peristome, *L. pyriforme* is more likely to be confused with members of the Bryaceae (where it was traditionally placed). However, no N.Z. representatives of the Bryaceae have linear-lanceolate and setaceous leaves. When sterile, *L. pyriforme* could be confused with *Ditrichum* spp., but its characteristic nearly black stems and the conspicuous red-brown axillary hairs distinguish it. When fruiting (as it commonly is), the capsules of *L. pyriforme* are completely unlike any *Ditrichum*. Sterile material of *L. pyriforme* could also be confused with *Orthodontium lineare*. The poorly defined and generally bistratose lamina of the upper subula, its axillary hairs, and its coarsely papillose rhizoids will

distinguish *L. pyriforme* from *O. lineare*. The two species favour different habitats and both commonly fruit, reducing the probability of confusion.

Etymology: The epithet “*pyriforme*” refers to the pear-shaped capsules.

***Meesia* Hedw., *Sp. Musc. Frond.*, 173 (1801) nom. cons.**

Type taxon: *Meesia longiseta* Hedw.

Plants medium-sized to robust, green, yellow-green, brown or blackish, dull, in loose or dense turves. **Stems** densely beset with papillose, chocolate brown or nearly black rhizoids, sparsely leaved, nearly simple or branched. **Leaves** erect or loosely spreading, not or scarcely larger near stem apex, ovate-lanceolate, lingulate, or broadly lanceolate, rounded or acute, mostly entire, variably decurrent; **upper laminal cells** mostly oblong-rectangular, small and smooth, becoming elongate and pellucid below. **Costa** failing below the leaf apex.

Autoicous or dioicous. **Setae** very long; **capsules** suberect, narrowly-pyriform, asymmetric, bent (sometimes abruptly) at base of the urn, with a clearly defined neck \pm equal to the urn; **stomata** restricted to upper neck, large and superficial; **annulus** poorly differentiated. **Exostome teeth** short, often fragile, truncate, indistinctly cross-striolate and fused at base; **endostomal segments** narrowly linear, 2–4 times the teeth in length and often fused apically by lateral projections; **cilia** short or rudimentary, or \pm the length of the segments and reduced to a delicate chain of fragments. **Calyptra** cucullate and smooth.

Taxonomy: A genus of <10 species, occurring predominantly in the northern hemisphere, but with one species in N.Z. The genus is represented by two species in eastern mainland Australia (Bell & Catcheside 2006) and also occurs in southern South America.

Etymology: The genus was named after David Meese, a Dutch gardener (Crum & Anderson 1981, p. 626).

Excluded Taxa: *Meesia novae-zealandiae*: The type of *M. novae-zealandiae* Dixon & Sainsbury is referable to *Philonotis pyriformis*.

Meesia triquetra: Eddy (1996, p. 260) suggested that this species occurs in N.Z., but it seems that he did not see material from this country; the source of his second-hand record is not known. *Meesia triquetra* is widespread in the northern hemisphere. It is recorded from Malesia by Eddy and from mainland Australia (N.S.W., Vic., and A.C.T.) by Bell & Catcheside (2006). *Meesia triquetra* has clearly three-ranked and strongly squarrose leaves. It is not considered further here.

***Meesia uliginosa* Hedw., *Sp. Musc. Frond.*, 173 (1801)**

Type: Europe. Not seen.

- = *Meesia macrantha* Mitt., *Hooker's J. Bot. Kew Gard. Misc.* 8: 260 (1856) nom. illeg.
Isotype: Australia, Victoria, Mt Cobberas, *F. Mueller*, BM-Hooker! Holotype in NY designated by Bell & Catcheside (2006).
- = *Meesia muelleri* Müll.Hal. & Hampe, *Linnaea* 28: 208 (1856) — as mülleri
Holotype: Australia, Victoria, Mt Cobberas, *F. Mueller*, BM-Hampe! (Cited but apparently not seen by Bell & Catcheside (2006).)
- = *Meesia aquatica* R.Br.bis, *Trans. & Proc. New Zealand Inst.* 31: 465 (1899)
Holotype: N.Z., Canterbury, Kowai River, Mt Torlesse, Jan. 1887, *R. Brown s.n.*, CHR 335683!
- = *Meesia aquatilis* R.Br.bis, *Trans. & Proc. New Zealand Inst.* 31: 465 (1899)
Lectotype: N.Z., Canterbury, Broken River., *R. Brown* 246, CHR 335682! Isolectotype: BM-Dixon!
- = *Meesia buchananii* R.Br.bis, *Trans. & Proc. New Zealand Inst.* 31: 464 (1899) — as buchanani
Lectotype: N.Z., Canterbury, Port Lyttelton Hills, Kennedy's Bush, Jan. 1882, *R. Brown s.n.*, CHR 335684! Isolectotype: BM-Dixon!
- = *Meesia kirkii* R.Br.bis, *Trans. & Proc. New Zealand Inst.* 31: 463 (1899)
Lectotype: N.Z., Southland, near Lake Te Ānau, *R. Brown* 245, CHR 335685! Isolectotype: BM-Dixon!

Plants yellow-green. **Stems** simple or branching by subperigonal innovation, <15–55 mm, green above, becoming brown or black below, in cross-section with 2 layers of firm-walled cortical cells and a

central strand, densely beset with coarsely papillose, chocolate brown rhizoids. **Leaves** erect-spreading when moist, weakly crisped when dry, oblong-lingulate or ovate-lanceolate, broadly rounded at apex, (1.0–)1.7–3.2 × c. 0.6 mm, in several ranks, not decurrent, entire, in cross-section broadly V-shaped and with plane or recurved margins; **upper laminal cells** oblong or rectangular, c. 24–40 × 10–12 µm, firm-walled, shorter at extreme apex; **basal laminal cells** thinner-walled and longer; **alar cells** not differentiated or somewhat shorter than adjacent cells. **Costa** broad, c. 1/3–1/2 the leaf width at base, somewhat undulate in upper leaf, in cross-section protruding mainly on abaxial surface, cells of ± uniform size throughout, lacking stereids. **Axillary hairs** numerous and conspicuous, usually remaining attached to stem when leaves are removed, the lowermost 2–3 cells red-brown and the terminal cells hyaline and cylindrical.

Autoicous in N.Z. material. **Perichaetia** appearing lateral due to innovation; **perichaetial leaves** longer (to c. 3.7 mm) but otherwise similar to vegetative, enclosing archegonia and a few filiform paraphyses (with cylindrical terminal cells). **Perigonia** inconspicuous, with broadly ovate bracts surrounding numerous antheridia and numerous clavate paraphyses (6–10 cells and c. 150–180 µm long, with an oblong to globose, and weakly inflated terminal cells). **Setae** very long, (12–)20–40 mm, twisted to the right below and to the left above, yellow-brown; **capsules** suberect, asymmetric, and sharply curved from a clearly defined and long neck (c. 1/3 to 1/2 the total capsule length), smooth, elongate-pyriform with an oblique mouth, c. 2.5–3.0 mm, pale red-brown at maturity; **exothecial cells** mostly short oblong, firm-walled, occasionally weakly thickened at corners, oblate and darker in several rows at mouth; **endostomal cilia** rudimentary. **Calyptra** c. 3 mm. **Spores** spherical, 45–54 µm, finely bullate.

Illustrations: Plate 2. Crum & Anderson 1981, fig. 295; Matteri & Ochyra 1999, figs 4–5; Smith 2004, fig. 170, 3–5; Ochyra et al. 2008, fig. 227.

Distribution: SI: Nelson, Marlborough (Fish Lake), Canterbury, Otago, Southland (South Branch Eglinton River, Te Ānau); Ch.

Bipolar. Mainland Australia*, North America*, Europe*, and Asia. Recorded from temperate South America by Matteri & Ochyra (1999), and the Antarctic Peninsula and its associated islands by Ochyra et al. (2008).

Habitat: On wet humic soil in mineral-rich sites, often at stream margins in tussock grasslands, in fens and marshes (including those dominated by *Typha orientalis*). Also in seepages within *Oreobolus pectinatus*-dominated cushion bogs and sometimes associated with *Schoenus pauciflorus* on wet, ± vertical banks. *Campyliadelphus stellatus* is a very frequent associate and less commonly *Breutelia pendula*, *Drepanocladus aduncus*, *Fissidens adianthoides*, *Philonotis tenuis*, and various *Bryum* spp. *Meesia uliginosa* can dominate areas of several square metres extent. Occurring from near sea level (in coastal Otago) to c. 1500 m (Criffel Range, Otago L.D.), but rare below c. 500 m.

Notes: Known from Chatham Is only from a single non-localised collection by T. Kirk (CHR 524906). The absence of records from the North I. is curious and could reflect the paucity of appropriate habitats there or simply be a collection artefact; Sainsbury (1955) also remarked on the absence of North I. collections.

Apparent annual growth increments can occasionally be seen in material from higher elevations (e.g., *J. Child* 6049, Old Man Range, Otago L.D., CHR 430790). Scott & Stone (1976, p. 304) cite Australian material with stems to 90 mm.

Although some N.Z. material has vegetative leaves shorter than representative for the species, it falls well within the range of continuous variation in the northern hemisphere material. Several Australasian treatments, including Dixon (1926); Sainsbury (1955); and Bell & Catcheside (2006) have persistently used the name *Meesia muelleri* Müll.Hal. & Hampe for this species. The use of this name in the Australasian literature seems to reflect a regional bias and a reluctance to compare Australasian material to the predominantly northern hemisphere *M. uliginosa* Hedw.

Five of the names treated as synonyms here were initially synonymised with *M. muelleri* by Dixon (1926). *Meesia muelleri* and *M. macrantha*, both Australian names that have been applied to N.Z. material, were described from duplicates of one F. Mueller collection from Mt Cobberas in the Victorian Alps. There are several duplicates of the Mueller collection (“in sphagnetis montis Cobberas”) in MEL (P. Milne, pers. comm., 5 Aug. 2014). Bell & Catcheside (2006) designated material in BM-Hampe (apparently the same specimen cited in the synonymy above) as the holotype of *M. muelleri* Müll.Hal. & Hampe, but they apparently did not sight this specimen.

Meesia uliginosa is such a distinctive plant that confusion with any other N.Z. species seems unlikely. Dixon (1926, p. 224) aptly described it (as *M. muelleri*) as “a usually tall, richly fruiting, paludal moss,

with oblong-lingulate, widely obtuse, entire leaves, somewhat lax, pellucid, subquadrate, smooth upper cells, and nerve ceasing much below apex”.

Etymology: The epithet *uliginosa* refers to marshy habitats.

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Conventions

Abbreviations and Latin terms

Abbreviations	Meaning
A	Auckland Islands
A.C.T.	Australian Capital Territory
<i>aff.</i>	allied to (<i>affinis</i>)
agg.	aggregate
Ant	Antipodes Islands
a.s.l.	above sea level
<i>auct.</i>	of authors (<i>auctorum</i>)
B	Bounty Islands
C	Campbell Island
c.	about (<i>circa</i>)
cf.	compare with, possibly the species named (<i>confer</i>)
<i>c.fr.</i>	with fruit (<i>cum fructibus</i>)
Ch	Chatham Islands
<i>comb. nov.</i>	new combination (<i>combinatio nova</i>)
D'U	D'Urville Island
et al.	and others (<i>et alia</i>)
et seq.	and following pages (<i>et sequentia</i>)
ex	from
fasc.	fascicle
<i>fide</i>	according to
GB	Great Barrier Island
HC	Hen and Chicken Islands
Herb.	Herbarium
hom. illeg.	illegitimate homonym
I.	Island
ibid.	in the same place (<i>ibidem</i>)
incl.	including
<i>in herb.</i>	in herbarium (<i>in herbario</i>)
<i>in litt.</i>	in a letter (<i>in litteris</i>)
<i>inter alia</i>	among other things (<i>inter alia</i>)
Is	Islands
K	Kermadec Islands
KA	Kapiti Island
LB	Little Barrier Island
L.D.	Land District or Districts
<i>leg.</i>	collected by (<i>legit</i>)
loc. cit.	in the same place (<i>loco citato</i>)
l:w	length:width ratio
M	Macquarie Island
Mt	Mount
<i>nec</i>	nor
NI	North Island
no.	number
nom. cons.	conserved name (<i>nomen conservandum</i>)
nom. dub.	name of doubtful application (<i>nomen dubium</i>)
nom. illeg.	name contrary to the rules of nomenclature (<i>nomen illegitimum</i>)
nom. inval.	invalid name (<i>nomen invalidum</i>)
nom. nud.	name published without a description (<i>nomen nudum</i>)
<i>non</i>	not
N.P.	National Park
N.S.W.	New South Wales
N.T.	Northern Territory (Australia)
N.Z.	New Zealand
op. cit.	in the work cited (<i>opere citato</i>)
pers. comm.	personal communication

PK	Poor Knights Islands
P.N.G.	Papua New Guinea
<i>pro parte</i>	in part
Qld	Queensland
q.v.	which see (<i>quod vide</i>)
RT	Rangitoto Island
S.A.	South Australia
<i>s.coll.</i>	without collector (<i>sine collectore</i>)
<i>s.d.</i>	without date (<i>sine die</i>)
sect.	section
SEM	scanning electron microscope/microscopy
<i>sensu</i>	in the taxonomic sense of
SI	South Island
<i>sic</i>	as written
<i>s.l.</i>	in a broad taxonomic sense (<i>sensu lato</i>)
<i>s.loc.</i>	without location (<i>sine locus</i>)
Sn	Snares Islands
<i>s.n.</i>	without a collection number (<i>sine numero</i>)
Sol	Solander Island
sp.	species (singular)
spp.	species (plural)
<i>s.s.</i>	in a narrow taxonomic sense (<i>sensu stricto</i>)
St	Stewart Island
<i>stat. nov.</i>	new status (<i>status novus</i>)
subg.	subgenus
subsect.	subsection
subsp.	subspecies (singular)
subsp.	subspecies (plural)
Tas.	Tasmania
TK	Three Kings Islands
U.S.A.	United States of America
var.	variety
vars	varieties
Vic.	Victoria
viz.	that is to say (<i>videlicet</i>)
vs	versus
W.A.	Western Australia

Symbols

Symbol	Meaning
µm	micrometre
♂	male
♀	female
±	more or less, somewhat
×	times; dimensions connected by × refer to length times width
>	greater than
<	less than
≥	greater than or equal to
≤	less than or equal to
=	heterotypic synonym of the preceding name
≡	homotypic synonym of the preceding name
!	confirmed by the author
*	in distribution statements, indicates non-N.Z. localities from which material has been confirmed by the author

Technical terms conform to Malcolm, B.; Malcolm, N. 2006: *Mosses and other Bryophytes: an Illustrated Glossary*. Edition 2. Micro-Optics Press, Nelson.

Abbreviations for Herbaria follow the standard abbreviations listed in *Index Herbariorum*.

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Plate 1: *Leptobryum*. A–D: *L. pyriforme*. A, habit with capsule, dry. B, capsule, dry. C, leaves. D, leaf apex. Drawn from A.J. Fife s.n., 27 Mar. 1983, CHR 351306.

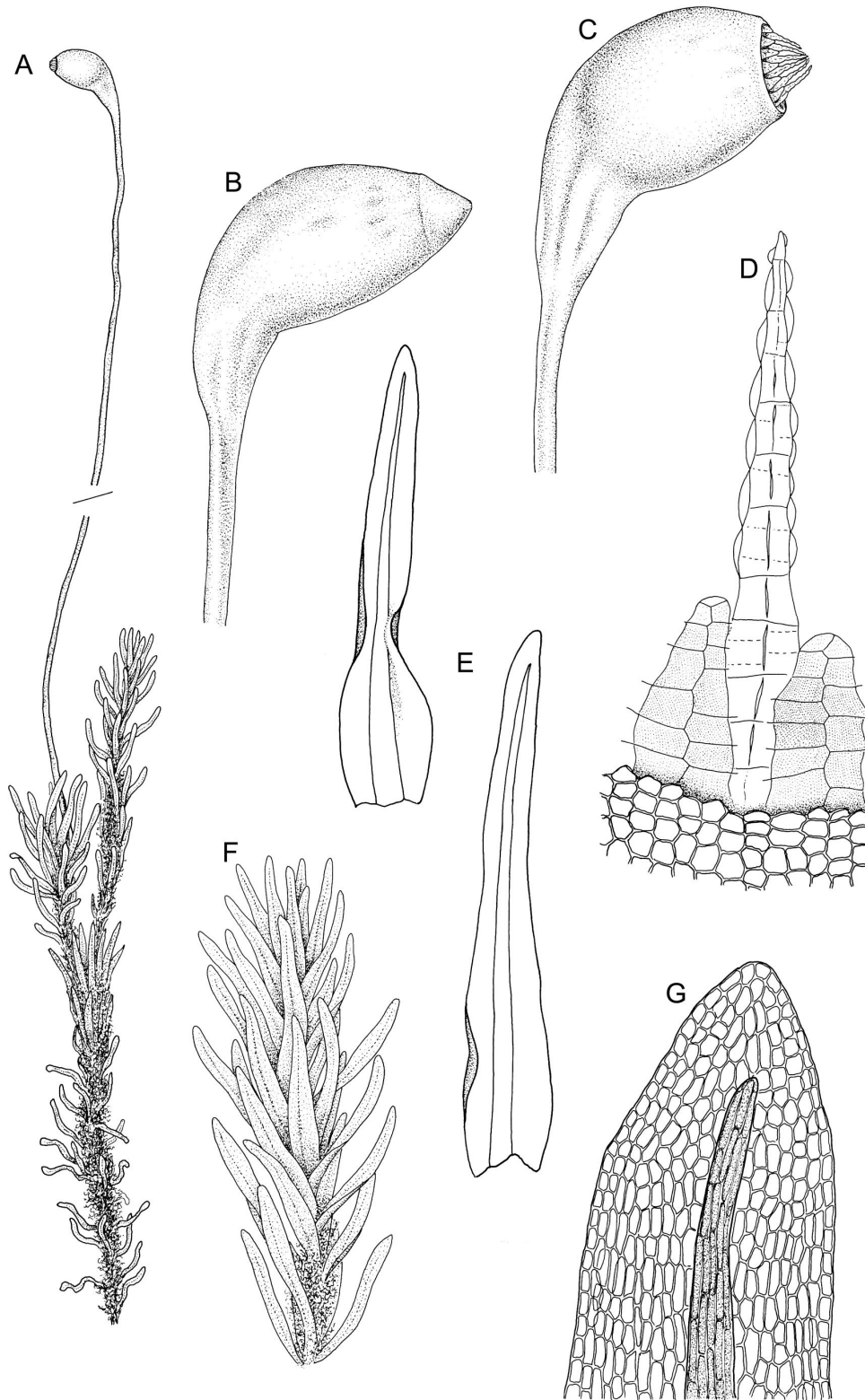
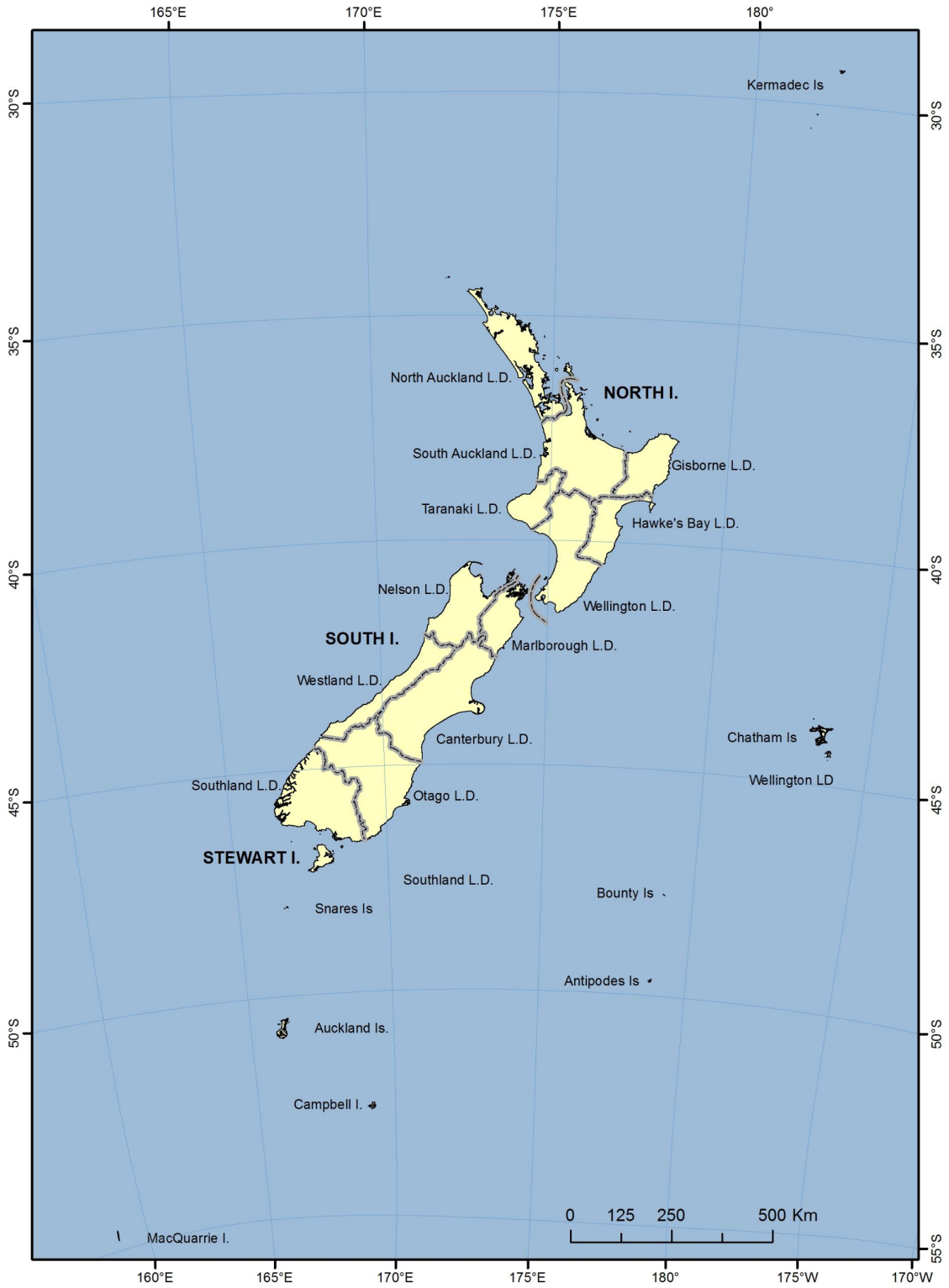
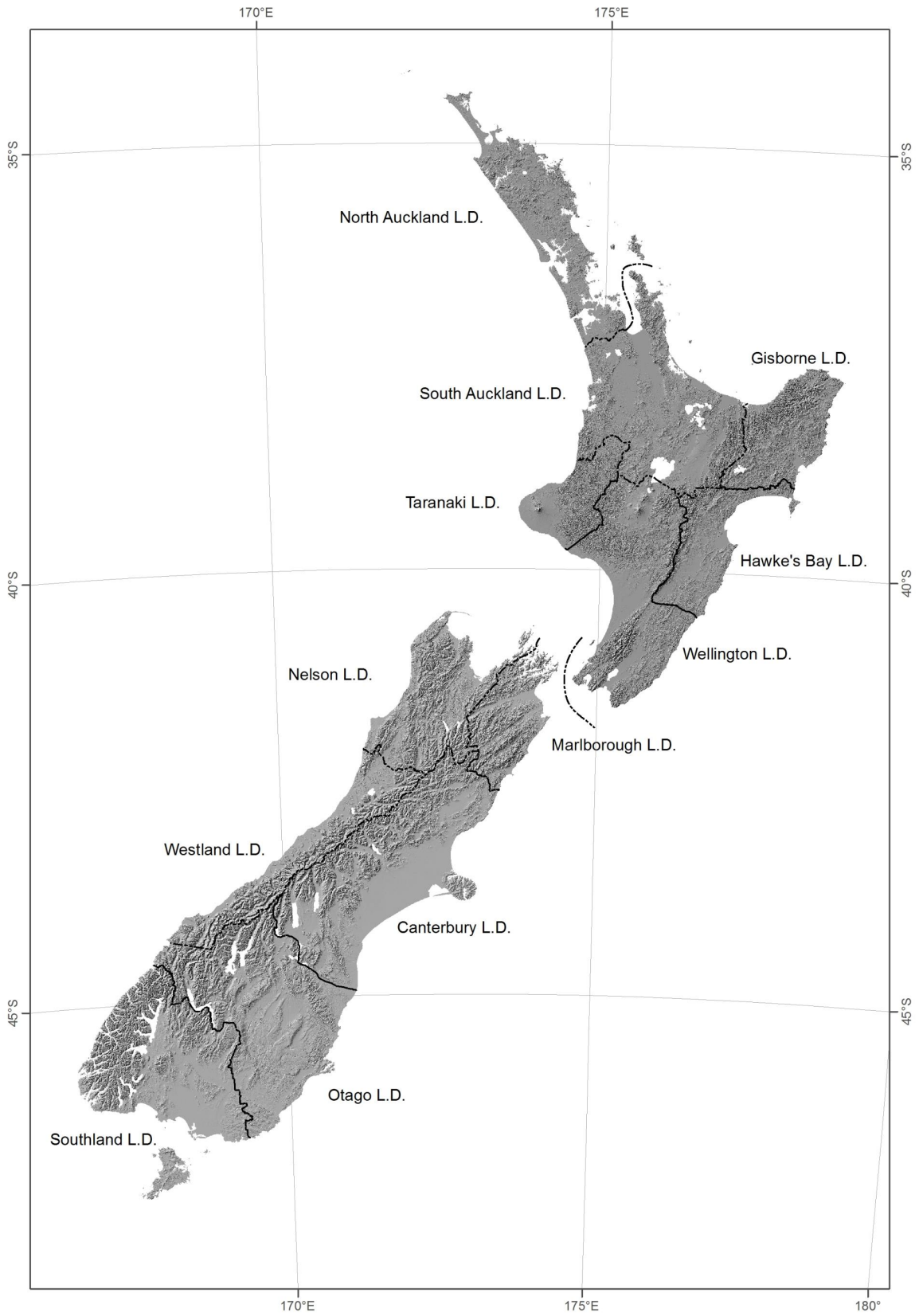


Plate 2: *Meesia*. A–G: *M. uliginosa*. A, habit with capsule. B–C, capsules. D, peristome detail. E, leaves. F, portion of shoot. G, leaf apex. Drawn from *B.H. Macmillan* 73/235, CHR 164922.



Map 1: Map of New Zealand and offshore islands showing Land District boundaries



Map 2: Map of main islands of New Zealand showing Land District boundaries

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and *italic* for synonyms.

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