



FLORA OF NEW ZEALAND

MOSSES

PLAGIOTHECIACEAE



A.J. FIFE

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Cover image: *Plagiothecium lamprostachys*, habit with capsules. Redrawn by Rebecca Wagstaff from Ireland (1992).

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Introduction

The Plagiotheciaceae are usually considered to be monotypic, with the relatively large genus *Plagiothecium* widely distributed in temperate regions of both hemispheres and with some species on tropical mountains. The family is closely allied to the Hypnaceae. Species of *Plagiothecium* are pleurocarpous, mostly lustrous mat-forming mosses with more or less complanate shoots, inflated cortical cells, decurrent and usually asymmetric leaves with linear laminal cells, short and forked costa, and differentiated alar cells. The genus in New Zealand presents taxonomic difficulties greater than suggested by the single species treated here. Our material has historically sometimes been treated as two species, and has been considered conspecific, wholly or in part, with the northern hemisphere *P. denticulatum*. N.Z. material differs from that species mainly by its sexuality and leaf apex form.

Although N.Z. material is variable in habit, it is interpreted here as one species, *P. lamprostachys* (Hampe) A.Jaeger, which has a Victorian type and is restricted to Australasia. The widely applied name *P. novae-seelandiae* Broth. is considered a taxonomic synonym. Our single species occurs predominantly in rock crevices and ranges from low elevations to nearly 2000 m.

Plagiotheciaceae

Taxonomy: The family is usually considered by modern authors to be monogeneric (Ireland 1986), although Brotherus (1925) included other genera. A detailed description of the family (and the genus *Plagiothecium*) is provided by Buck & Ireland (1985), who characterised the family as “pleurocarpous mosses that are mostly complanate-foliate with stems that have an outer row of thin-walled cells, leaves that are decurrent and often asymmetric with costae short and double, leaf cells that are smooth, \pm linear, and heavily chlorophyllose, and differentiated alar cells that are confined to the basal angles.”

The family is retained in the order Hypnales by Goffinet et al. (2009), who also included the genus *Struckia* Müll.Hal. This small Asian genus has been placed traditionally in Sematophyllaceae; it is not considered here. Crum & Anderson (1981) hesitantly included the poorly understood tropical genus *Stereophyllum* Mitt. in the Plagiotheciaceae; it is not considered here either.

Plagiothecium Schimp. in Bruch et al., *Bryol. Eur.* 5, 179 (1851)

Type taxon: *Plagiothecium denticulatum* (Hedw.) Schimp.

The following generic description draws on Buck & Ireland (1985) and Ireland (1986).

Plants mat-forming, light-, dark-, or yellow-green, often glossy. **Stems** prostrate or occasionally ascending, irregularly branched or rarely simple, mostly complanate-foliate, sometimes \pm julaceous, in cross-section with central strand present or indistinct, with the outermost layer of cells enlarged and thin-walled. **Branches** prostrate or ascendant. **Stem** and **branch** leaves similar, soft, imbricate, complanate to julaceous, erect or spreading, ovate to ovate-lanceolate, often asymmetric, concave, entire or serrulate at apex, decurrent; **upper laminal cells** linear or linear-rhomboid, smooth (in N.Z. species), shorter in leaf apex, below broader, shorter, and sometimes weakly porose, not pigmented at base; **alar cells** differentiated, usually inflated, \pm decurrent. **Costa** short and double, occasionally single forked or simple. **Asexual propagulae** often present in leaf axils (but absent in N.Z. species), cylindric or fusiform, uniseriate. **Paraphyllia** and **pseudoparaphyllia** lacking.

Autoicous or occasionally dioicous. **Perichaetia** and **perigonia** often clumped near stem base. **Setae** elongate, smooth; **capsules** erect to cernuous, oblong-cylindric or ovoid, often striate when dry; **exothecial cells** thin- or thick-walled; **stomata** present in neck; **annulus** differentiated, composed of inflated hyaline cells in N.Z. species; **operculum** conic or rarely \pm rostrate. **Peristome** hypnoid. **Calyptra** cucullate, smooth, falling early. **Spores** nearly round to broadly elliptic, smooth or minutely ornamented.

Taxonomy: A genus of about 90 species according to Buck & Ireland (1985), occurring mainly in temperate regions and at high elevations in the tropics. Eventual revision will probably substantially reduce the number of accepted species.

The genus *Plagiothecium* in N.Z. presents taxonomic difficulties greater than the single species recognised here would suggest. While no member of this genus seems to be discussed by Wilson (1854), Hooker's *Handbook* (1867) reported a single collection of the northern hemisphere *P. (Hypnum) denticulatum* from southern beech forest in Canterbury. Brotherus (1916) proposed a second species, and Dixon (1929) chose to recognise both *P. denticulatum* (L.) B.S.G. and *P. novae-seelandiae* Broth. from N.Z., differentiating them on the basis of their sexualities and leaf apical shapes. Sainsbury (1955) recorded only one species, for which he used the name *Plagiothecium denticulatum* (Hedw.) B.S.G. Ireland (1992) reviewed the Australasian material and concluded that *P. denticulatum* “probably occurs only in the Northern Hemisphere” and that Australasian material so-named is better considered as *P. novae-seelandiae* Broth.; he also recorded the South American *Plagiothecium lucidum* from N.Z. Ochyra (2002) subsequently synonymised *P. novae-seelandiae* with the Australian *P. lamprostachys* (Hampe) A.Jaeger.

The characters used by Ireland (1992) to differentiate his two alleged N.Z. species are difficult to apply across a broad range of material, although extreme forms have a very different gestalt. The differing appearance provides some support for Ireland's (and Dixon's) interpretation regarding the presence of two distinct taxonomic entities. Among the characters in Ireland's key are the width of the leaf decurrency, the width of mid laminal cells, and the presence or absence of flagelliferous branches; however, a large fraction of herbarium collections/populations are intermediate with respect to these characters. Many intermediates have markedly complanate shoots and branches, and distinctly asymmetric leaf bases (allegedly features of *P. lucidum*) associated with leaves that are broad at apices and not or only weakly wrinkled when dry (allegedly features of well-developed *P. lamprostachys*). Such intermediates are widely distributed regionally. The size of laminal cells is

also variable and does not correlate well with either of Ireland's species concepts. The many morphological intermediates blur the distinction between the two alleged species and consequently only a single N.Z. species of *Plagiothecium* is accepted here.

Not all relevant types have been studied, and the taxonomic conclusions of Ochyra (2002) are adopted here. He recognised one species of *Plagiothecium* from Australasia, and considered *P. lamprostachys* (Hampe) A.Jaeger to be the earliest applicable name. Klazenga (2012) also accepted only *P. lamprostachys* in his treatment for Australia.

Excluded Taxa: *Plagiothecium helvolum* is an unpublished name applied by C. Müller *in herb.* to an R. Helms collection. Its "type" is referable to *Sauloma tenella*. This name is not considered further.

Plagiothecium laetum B.S.G. was recorded from Campbell I. by Vitt (1974), but there can be little doubt that his collections (not seen) represent *P. lamprostachys*. *Plagiothecium laetum* is a northern hemisphere species and is not considered further.

Plagiothecium lucidum (Hook.f. & Wilson) Paris. This name, based on a Chilean type, has been applied to N.Z. mainly by Ireland (1992). The reasons for rejecting it as a N.Z. species are outlined above.

***Plagiothecium lamprostachys* (Hampe) A.Jaeger, *Ber. Thätigk. St. Gallischen Naturwiss. Ges.* 1876–1877: 449 (1878)**

≡ *Hypnum lamprostachys* Hampe, *Linnaea* 30: 639 (1860)

Lectotype: Australia, Victoria, ad fl. Tarwin, *F. Mueller* 59, BM. (Designated by Ochyra 2002.)
Not seen

= *Plagiothecium novae-seelandiae* Broth., *Proc. Linn. Soc. New South Wales* 41: 594 (1916)

Isolectotype: N.Z., Westland, top of Ōtira Gorge, *T.W.N. Beckett* 918, CHR 534780!
(Lectotype designated by Ireland 1992.)

Misapplications: *Plagiothecium denticulatum sensu* Sainsbury (1955); *Plagiothecium lucidum sensu* Ireland (1992)

Plants medium-sized, pale- or yellow-green, glossy both fresh and dry. **Shoots** mostly complanate to ± julaceous. **Stems** prostrate, usually c. 20–60 mm, irregularly branched, beset with scattered, sparse fascicles of smooth brown rhizoids, in cross-section with a small and indistinct central strand.

Branches usually ascendant, some often somewhat flagelliferous. **Leaves** closely spaced, weakly to strongly asymmetric, smooth or wrinkled when dry, strongly or sometimes weakly concave, ovate (sometimes broadly), acute or obtuse at apex, entire or with a few apical denticulations, plane throughout or broadly inrolled on one margin for up to $\frac{2}{3}$ its length, decurrent, (1.65–)1.9–2.5(–2.7) × c. 0.65–1.3 mm (unflattened); **mid laminal cells** linear to linear-rhomboid, smooth, thin-walled, and pointed at ends, variable in size, mostly 80–185(–225) × 5–12 µm, becoming shorter and broader but not porose near base; **alar cells** inflated, mostly oblong and thin-walled, forming a narrow to broad (to c. 150 µm wide) decurrency that usually strips off with leaves. **Costa** forked just above base, the longer branch extending $\frac{1}{4}$ to $\frac{1}{2}$ the leaf length. **Asexual propagulae** absent.

Autoicous. Perichaetia scattered, c. 1 mm long, the leaves erect, ± tubulose, ecostate. **Perigonia** c. 0.3 mm scattered on stems but often numerous near stem base, the bracts broadly ovate. **Setae** slender and flexuose, red, dextrorse, c. 15–25 mm; **capsules** inclined to nearly horizontal, cylindric, curved, weakly sulcate and constricted below the mouth when dry, smooth when moist, with a distinct and wrinkled neck, (1.5–)2.0–2.5 mm, pale yellow-brown; **exothecial cells** firm-walled, mostly oblong; **stomata** conspicuous in neck, superficial; **operculum** conic. **Peristome** as for genus, pale; **cilia** mostly 2, nodose. **Spores** 8–15 µm, appearing smooth.

Illustrations: Plate 1. Ireland 1992, figs 1–8 (as *P. novae-seelandiae*); Malcolm & Malcolm 2003, p. 51 (as *P. novae-seelandiae*); Meagher & Fuhrer 2003, p. 45; Seppelt 2004, fig. 86; Seppelt et al. 2013, pl. 16 (reproduced in Australian Mosses Online).

Distribution: NI: N Auckland, offshore islands only (Hen I.), Gisborne (Toatoa, Maunga Pōhatu, near Lake Waikaremoana), Taranaki (Mt Taranaki), Wellington; SI: Nelson, Canterbury, Westland, Otago, Southland. Recorded from C by Vitt 1974 (as *P. laetum*) and from M by Seppelt 2004. No material has been confirmed from Hawke's Bay or Marlborough L.D.

Australasian. Tasmania* and mainland Australia (Vic.*). Klazenga (2012) recorded it from N.S.W.

Habitat: Most often occurring in rock crevices, on outcrops, or in boulder fields (on greywacke, granite, schist, or basalt). Less frequently in other habitats, including trunks of *Lophozonia menziesii*,

rotting logs, soil banks, humus over rock (apparently including limestone), and on the bases of snow-tussocks (as at Mt Arthur, Nelson L.D. and the Craigieburn Range, Canterbury L.D.). Mostly occurring in subalpine shrubland or in alpine areas, but also present in forest (mostly *Fuscospora solandri* s.l. or *Lophozonia menziesii* dominated). On Macquarie I. it occurs on litter and peat amongst grasses and rushes (R.D. Seppelt, pers. comm., 24 May 2018). On the North I. documented from low elevation to at least 900 m (Tararua Range, Wellington L.D.) and on the South I. documented from 150 m (vicinity Borland Lodge, Southland L.D.) to c. 1980 m (St Bathans Range, Otago L.D.). Frequently associated moss species include *Bartramia papillata*, *Catagonium politum*, *Distichophyllum pulchellum*, *D. rotundifolium*, *Fallaciella gracilis*, *Leptotheca gaudichaudii*, *Lepyrodon lagurus*, *Pyrrhobryum bifarium*, and *Thuidiopsis furfurosa*.

Recognition: Confusion sometimes occurs with *Sauloma tenella*, particularly when sterile. *P. lamprostachys* has erect leaf apices, whereas in *S. tenella* the leaf apex is usually somewhat reflexed. The absence of basal decurrencies and the generally weaker costae in *Sauloma* can facilitate differentiation. The septate fusiform gemmae of *Sauloma* are highly diagnostic, but are not always present.

This species is also sometimes confused with *Rhynchostegium tenuifolium*. *Plagiothecium lamprostachys* differs from that species by having entire margins, clearly forked costae, pale exostome teeth, and conic (not rostrate) opercula.

Etymology: The epithet, meaning bright-spike, is Greek-derived from *lampros* (bright) and *stachys* (spike), and refers to the shining nature of the individual shoots.

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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)
subspp.	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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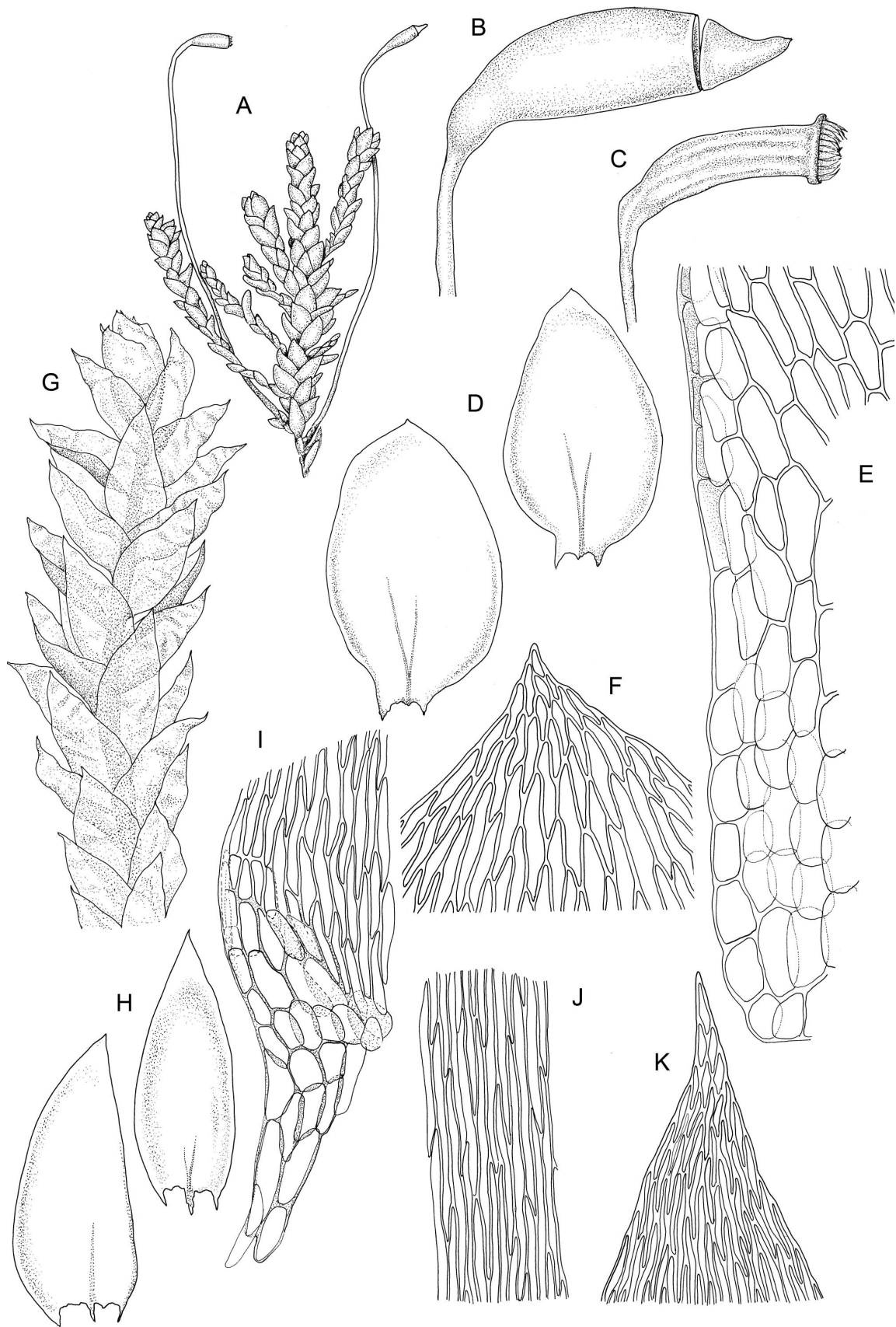
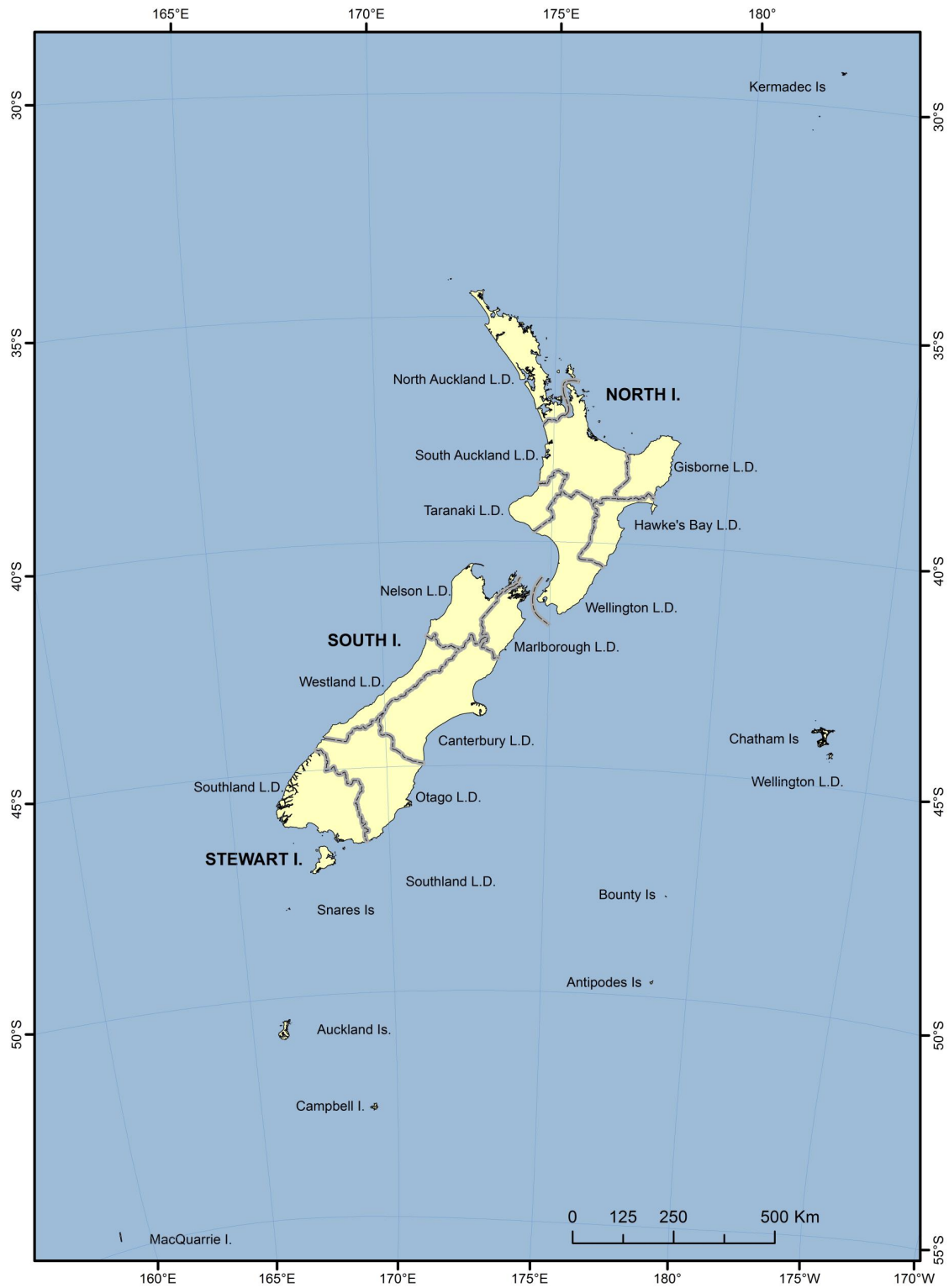
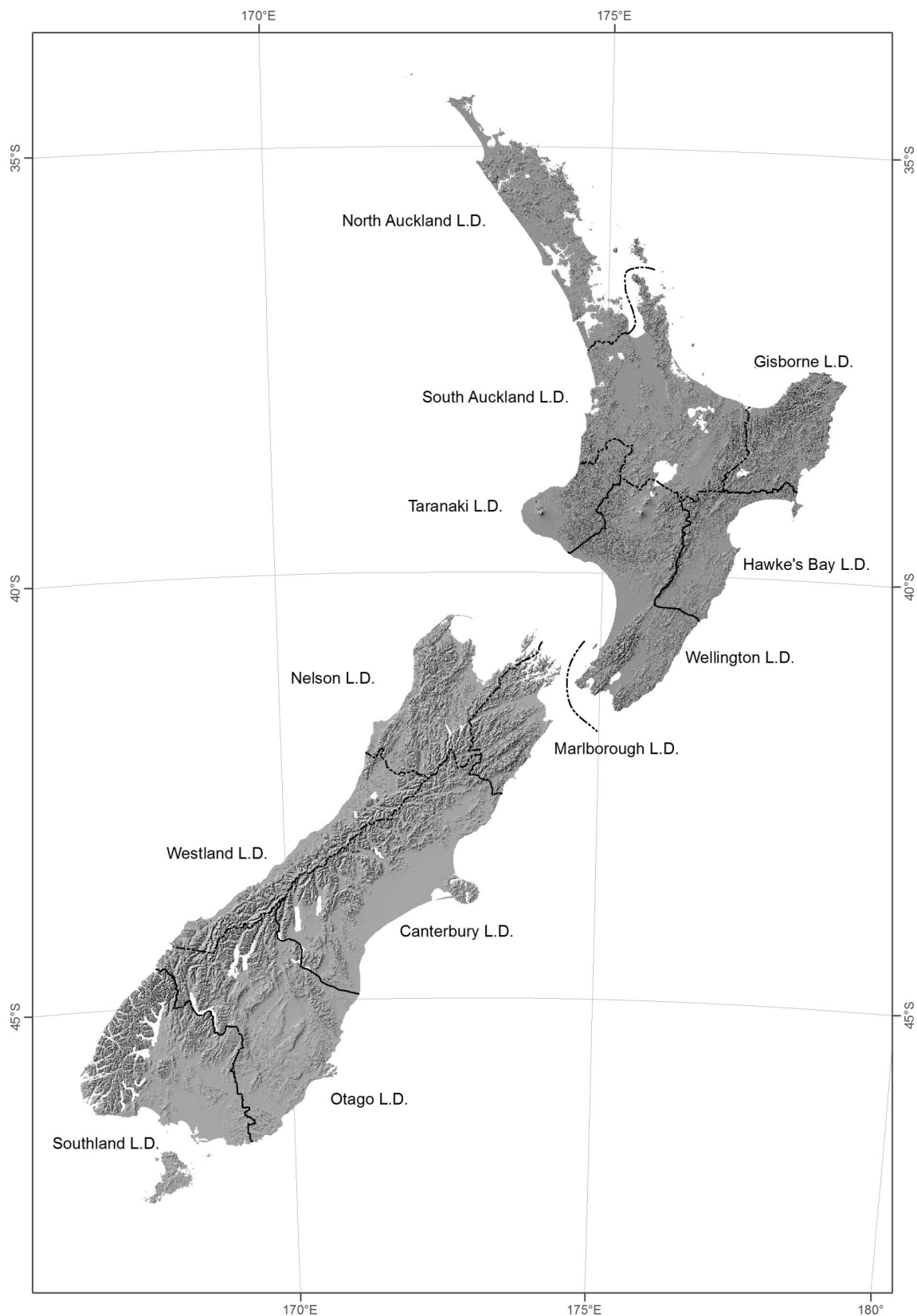


Plate 1: *Plagiothecium*. A–K: *P. lamprostachys*. A, habit with capsules. B, capsule, moist. C, capsule, dry. D, leaves. E, alar cells. F, leaf apex. G, shoot detail. H, leaves. I, alar cells. J, mid laminal cells. K, leaf apex. A, D–F, redrawn from Ireland (1992); B–C, drawn from A.J. Fife 7146, CHR 405837; G–K, drawn from B.H. Macmillan 792/18, CHR 413842.



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

Index

Page numbers are in **bold** for the main entry,
and *italic* for synonyms.

Hypnum lamprostachys Hampe **3**

Plagiotheciaceae **1, 2**

Plagiothecium Schimp. **1, 2, 2**

Plagiothecium lamprostachys (Hampe)
A.Jaeger **1–3, 3**

Plagiothecium novae-seelandiae Broth. **3**

Image Information

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Flora of New Zealand: PDF publications

The electronic Flora of New Zealand (**eFloraNZ**) project provides dynamic, continually updated, online taxonomic information about the New Zealand flora. Collaborators in the project are Manaaki Whenua – Landcare Research, the Museum of New Zealand Te Papa Tongarewa, and the National Institute of Water and Atmospheric Research (NIWA).

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The Moss Set covers indigenous and exotic mosses within the New Zealand Botanical Region.

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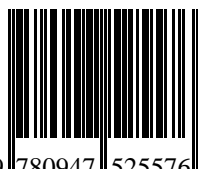
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