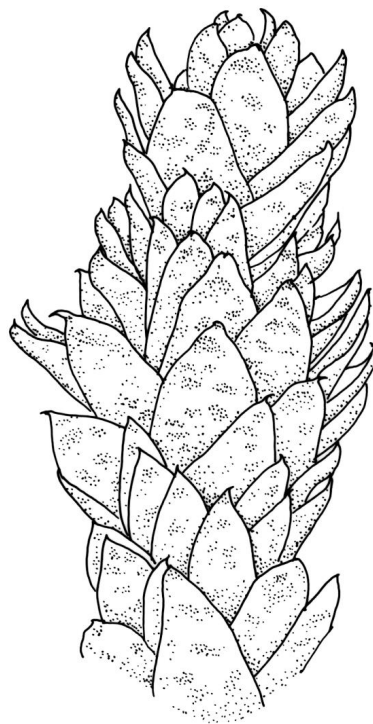




FLORA OF NEW ZEALAND
MOSESSES

PULCHRINODACEAE



A.J. FIFE

Fascicle 32 – APRIL 2017

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Cover image: *Pulchrinodus inflatus*, portion of shoot, dry. Drawn by Rebecca Wagstaff from A.J. Fife 11139, CHR 515101.

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Introduction

Pulchrinodus inflatus (Hook.f. & Wilson) B.H.Allen is one of the largest true mosses occurring in New Zealand, with stems sometimes exceeding 300 mm in length and membranous, wrinkled leaves up to 8 mm long and 3.8 mm wide. By these features this is a readily recognised plant in the N.Z. flora; it was first collected by the plant explorer William Colenso and initially described (as a *Hypnum*) by J.D. Hooker & W. Wilson in the *Flora Novae-Zelandiae* in 1854. It occurs in a range of vegetation types but is best developed in lava fields, in kauri gumlands, in mānuka/gorse scrub, and under regenerating kauri. It also occurs in geothermal fields and, on the South I., in heathlands, including pākahi. Twentieth century treatments of N.Z. mosses, including that of Sainsbury, placed this species in the genus *Eucamptodon*. Its systematic relationships have long been controversial, with placements proposed in several families. The recent creation of the monotypic Pulchrinodaceae, in the order Bryales, is founded predominantly on molecular evidence. The sole species in this family was long considered to be a N.Z. endemic, but recent studies have documented occurrences in both south-western Tasmania and eastern New Caledonia.

Pulchrinodaceae

Taxonomy: The monogeneric family *Pulchrinodaceae* was erected by Quandt et al. (2007) to accommodate the genus *Pulchrinodus*, which was erected 20 years earlier by Allen (1987b). The family and the genus are both monotypic and restricted to Australasia. The rationale for establishing the family is based primarily on molecular data presented in an earlier paper (Stech et al. 2003). The family is accepted by Goffinet et al. (2009), and their treatment, placing the family in the Bryales, is followed here.

***Pulchrinodus* B.H.Allen, *New Zealand J. Bot.* 25: 338 (1987)**

Type taxon: *Pulchrinodus inflatus* (Hook.f. & Wilson) B.H.Allen

Taxonomy: *Pulchrinodus* is a monotypic genus whose sole representative was treated in *Eucamptodon* by Sainsbury (1955). The sole species was subsequently segregated from *Eucamptodon* by Allen (1987b), who proposed the genus *Pulchrinodus* and suggested affinities to the Pterobryaceae. *Pulchrinodus inflatus*, or its precursors, has been placed by various authors in several families including the Dicranaceae, Pterobryaceae, Dicnemonaceae, Lembophyllaceae, and, most recently, the monotypic *Pulchrinodaceae*.

In a paper related to that cited above, Allen (1987a) treated a diminished *Eucamptodon* Mont. [Ann. Sci. Nat. Bot. ser. 3, 4: Pl. 14, fig. 3. 1845] as consisting of only *E. perichaetialis* (Mont.) Mont. of southern South America and *E. muelleri* Hampe & Müll.Hal. of eastern Australia, New Caledonia, and Norfolk I. The latter species he considered to have two varieties.

Etymology: According to Allen (1987b), the generic name is “a combination of the Latin adverb *pulchre*: beautifully, and the noun *nodus*: a knotty problem. The name is given in reference to the striking beauty of this moss and the puzzling systematic problem it presents”.

***Pulchrinodus inflatus* (Hook.f. & Wilson) B.H.Allen, *New Zealand J. Bot.* 25: 339 (1987)**

≡ *Hypnum inflatum* Hook.f. & Wilson in Wilson, *Bot. Antarct. Voy. II (Fl. Nov.-Zel.) Part II* 111 (1854)

≡ *Eucamptodon inflatus* (Hook.f. & Wilson) Mitt. in Beckett, *Trans. & Proc. New Zealand Inst.* 25: 300 (1892)

Holotype: N.Z., Northern Island, Manawaki, *W. Colenso*, BM. (Cited by Allen, 1987b.)

Holotype seen online, JSTOR Global Plants, accessed 18 Jan. 2017

= *Eucamptodon inflatus* var. *neocaldonicus* Cardot, *Bull. Herb. Boissier sér.* 2, 8: 166 (1908)

Isotype: New Caledonia, *Viellard*. (Isotypes in G cited by Allen 1987b.) Isotypes in PC seen online, JSTOR Global Plants, accessed 18 Jan. 2017.

Plants very robust, bright- or yellow-green above, dark green or brown below, forming erect turves or semi-creeping. **Stems** quite variable in length, commonly c. 30 to >300 mm, sparsely and irregularly branched and easily fragmenting, in cross-section with distinct but rather small central strand, and many layers of progressively thicker-walled and red-orange outer cells, the outermost with numerous oil-inclusions. **Shoots** commonly to 8–10 mm wide, often with areas of smaller and more widely spaced leaves below and larger more tightly spaced leaves near tips (sometimes with several alternate bands of smaller and larger more crowded leaves on one branched shoot). **Branch primordia** numerous, mostly arrested in early stages of growth. **Leaves** thin and membranaceous, spreading, more crowded near stem and branch tips, very strongly rugose or irregularly wrinkled both fresh and dry, rarely scarcely wrinkled, broadly ovate to broadly elliptic, rather quickly tapered to a small and reflexed acumen, strongly concave especially in upper portions, with the apex abruptly tapered to a tubular, sharply toothed, and ± reflexed acumen; folded weakly inwards at upper margins, entire except for the acumen, clasping but not decurrent at base, c. 5.5–8.0 × (2.0–)3.0–3.8 mm (under cover slip); **mid laminal cells** linear and ± vermicular, mostly (60–)75–120 × c. 7–9 µm, thick-walled, very strongly porose; cells at apex becoming shorter but otherwise similar; **marginal cells** not differentiated; **basal cells** shorter and strongly orange pigmented in several rows; **alar cells** forming a large and concave group, enlarged, thick-walled, unistratose, and ± quadrate, red- or yellow-brown. **Costa** mostly absent, occasionally double, ill-defined, and very short (not or scarcely exceeding the pigmented basal cells). **Axillary filaments** 1–2 per leaf, 6–8 cells long, with basal 1–2 cells square and red-brown, the upper cells short rectangular, and terminal cells enlarged (*vide* Allen, 1987).

Pseudoparaphyllia foliose-ciliate, the basal portion several cells wide, composed of incrassate and porose cells, best seen around arrested branch primordia.

Dioicous. **Perichaetia** unknown. **Perigonia** terminal, in discoid splash cups, with outer leaves broad and short, with the apex obtuse and apiculate, and with very numerous coloured quadrate cells in the lower part; innermost leaves very short, much wider than long, tubular, with the apex truncate and faintly mucronate and with the cells shortly oval; paraphyses nil; antheridia numerous, stalked, narrowly clavate, with empty antheridial jackets c. 700–800 µm long and borne on stalks c. 230–400 µm in length. **Sporophytes** unknown.

Illustrations: Plate 1. Allen 1987b, figs. 2–4; Seppelt et al. 2013, pl. 24; Malcolm & Malcolm 2003, p. 57.

Distribution: NI: N Auckland including offshore islands (RT, GB), S Auckland, Wellington (Wainuiomata); SI: Nelson, Marlborough (Pelorus Bridge Scenic Reserve, Bryant Range), Canterbury (Poulter River), Westland (Croesus Peak, Ōkārito), Southland; Ch (Ohira Bay, Pitt I.).

Australasian. Tasmania*, New Caledonia*.

Habitat: In the northern part of its range, where it is most abundant, *P. inflatus* most often occurs over volcanic rocks (especially lava, as on Rangitoto I.), where it commonly forms extensive (“up to 5 feet across”) swards and sometimes forms the dominant ground cover. It also occurs in kauri gum lands, and mānuka/gorse scrub, and under regenerating kauri. At Te Moehau (S Auckland L.D.) it occurs on summit rocks and in kauri swamplands and *Sphagnum* bogs. It is sometimes associated with sites where periodic burning occurs. L.B. Moore described colonies under mānuka and gorse scrub at Silverdale (N Auckland L.D.; CHR 351344.) as “abundant and increasing” in the 1930s, while F.W. Bartlett described it at the same locality (quoted by Allen 1987b, p. 341) as “on my property literally cover [ing] acres with a beautiful carpet up to a foot deep.” Material from geothermally heated ground near a geyser has been collected from Geyser Valley near Wairakei, and Matt Renner (pers. comm., 15 April 2010) informed me that this species grew on geothermally altered clay around thermal vents in the Paeroa Range near Rotorua (both in S Auckland L.D.). On South I. it is mostly restricted to wetter regions and most commonly grows beneath mānuka (and sometimes dwarf southern beech) in heathland, including pākihi and similar vegetation with impeded drainage. It is documented from numerous localities in both Nelson and Southland L.D., and at some can be classed as abundant (e.g., Te Kuha Ridge near Mt Rochfort, Nelson L.D.). In the Bryant Range it grows over ultra-mafic bedrock. It rarely occurs in lowland mixed podocarp forest (as at Pelorus Bridge Scenic Reserve). On Pitt I. it was collected by P.J. de Lange in 2008 growing in patches in an “ailing *Dracophyllum arboreum* forest remnant at c. 80 m elev.” Commonly associated species include the mosses *Campylopus introflexus*, *Dicranoloma robustum*, *Ditrichum punctulatum*, *Rhacocarpus purpurascens*, *Sclerodontium pallidum*, and *Sphagnum* spp.; the lichens *Cladia aggregata*, *C. retipora*, and *Siphula decumbens*; and the vascular plants *Gleichenia dicarpa*, *Empodisma minus*, *Dracophyllum* spp., and *Carpha alpina*. On the North I. ranging from sea level (Rangitoto I., North Auckland L.D.) to c. 850 m (Te Moehau, South Auckland L.D.) and on the South I. from 30 m (Pelorus Bridge Scenic Reserve) to at least 1000 m (Denniston Plateau, Nelson L.D.).

Notes: *Pulchrinodus inflatus* is among the most dramatic and conspicuous of New Zealand mosses, albeit one of rather patchy distribution and largely restricted to wetter portions of the country. Its robust habit, very large, membranaceous, and usually strongly rugose leaves, which are often crowded and larger near the stem apices, make *Pulchrinodus* highly recognisable.

Allen (1987b) used the presence of seven characters that he considered to be of “primary importance” (viz., pseudoparaphyllia, rudimentary costae, long incrassate and porose laminal cells, unbranched habit, presence of a central strand, numerous arrested branch primordia, and leaves evenly arranged around the stem) to argue in favour of a relationship to the Pterobryaceae, perhaps near the African genus *Hildebrandtiella*. While he predicted that a new family might eventually be required to accommodate the genus, he considered the creation of such a family would be premature until sporophytes were located.

The arrested branch primordia, and their associated foliose-ciliate pseudoparaphyllia, are easily observed (although staining is helpful) by stripping the leaves from a portion of the upper stem and examining the naked stem under the stereoscope. The published notes of Allen (1987b) have been relied upon for the description of axillary hairs, which have not been seen. Allen’s (1987b, p. 336) observations concerning the fragmentation of the brittle apical portion of the stems leading to the release of a subtending primordial branch and its overtopping of the broken stem is consistent with my observations. He suggested that the activation of these branch primordia results in the uneven vertical distribution of leaves that is characteristic of this genus. Both Sainsbury (1955) and Allen emphasised the alternate banding of densely and widely spaced leaves as a feature of the genus. In well-

developed plants some degree of banding can nearly always be observed, but this is often an inconspicuous feature in herbarium material; the concentration of leaves at the stem tips is less pronounced than in species such as *Ptychomnion aciculare*. In stem cross-section the contents of the outermost layer of cells are difficult to observe but appear to have numerous oil inclusions that make them appear papillose.

Male sex organs are rare in *Pulchrinodus* and I have seen unquestionable perigonia only in herbarium material from Rangitoto I. (*W.R. Sykes 146/90*, CHR 472452) and from Silverdale (N Auckland L.D., *F.W. Bartlett s.n.*, CHR 40321). My observations on the perigonia in these plants largely agree with those of both Sainsbury and Allen (1987b, p. 336). Allen (1987b) used information about the terminal perigonium of *Pulchrinodus* to infer that it is an acrocarpous moss.

The only Tasmanian material examined is a fragmentary collection from Mt Hean in south-west Tasmania (CHR 352750). It is unusual by having very weakly wrinkled dry leaves, and apparently is the same material as that illustrated by Seppelt et al. (2013). There are three other south-western Tasmanian specimens in HO (*vide* Lynette Cave, pers. comm., 17 Jan. 2017), all from elevations of 700 m or greater. Apart from the Mt Hean collection, all the Tasmanian collections have conspicuously wrinkled leaves “more like the New Zealand material”.

There appears to be no type material of *Hypnum inflatum* present in N.Z. herbaria, but the two collections (duplicates of which were presumably seen by Mitten) cited by Beckett (1893) when transferring this species from *Hypnum* to *Eucamptodon* are represented in CHR.

In a N.Z. context, *P. inflatus* is only likely to be confused with *Dicranoloma obesifolium*. In *P. inflatus* the vegetative leaves are strongly rugose, ecostate, or with inconspicuous double costae, and a small, reflexed acumen, whereas in *D. obesifolium* the leaves are non-rugose, singly costate, and apically rounded. *Pulchrinodus inflatus* occurs at lower elevations (to c. 1000 m) and is not known with capsules, while the higher elevation (mostly above 1000 m) *D. obesifolium* frequently fruits.

Etymology: The specific epithet refers to the tumid nature of the plants in the type collection.

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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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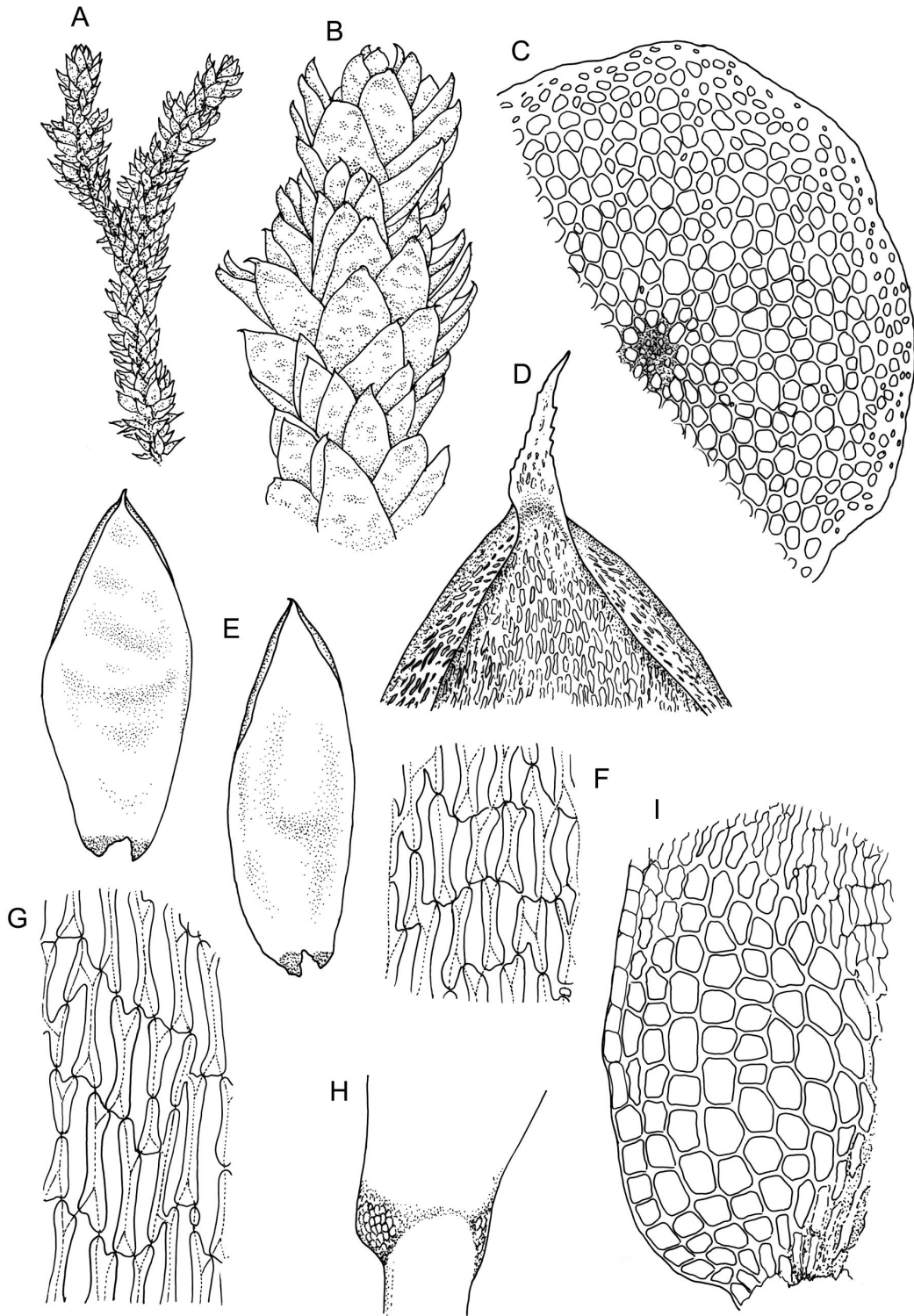
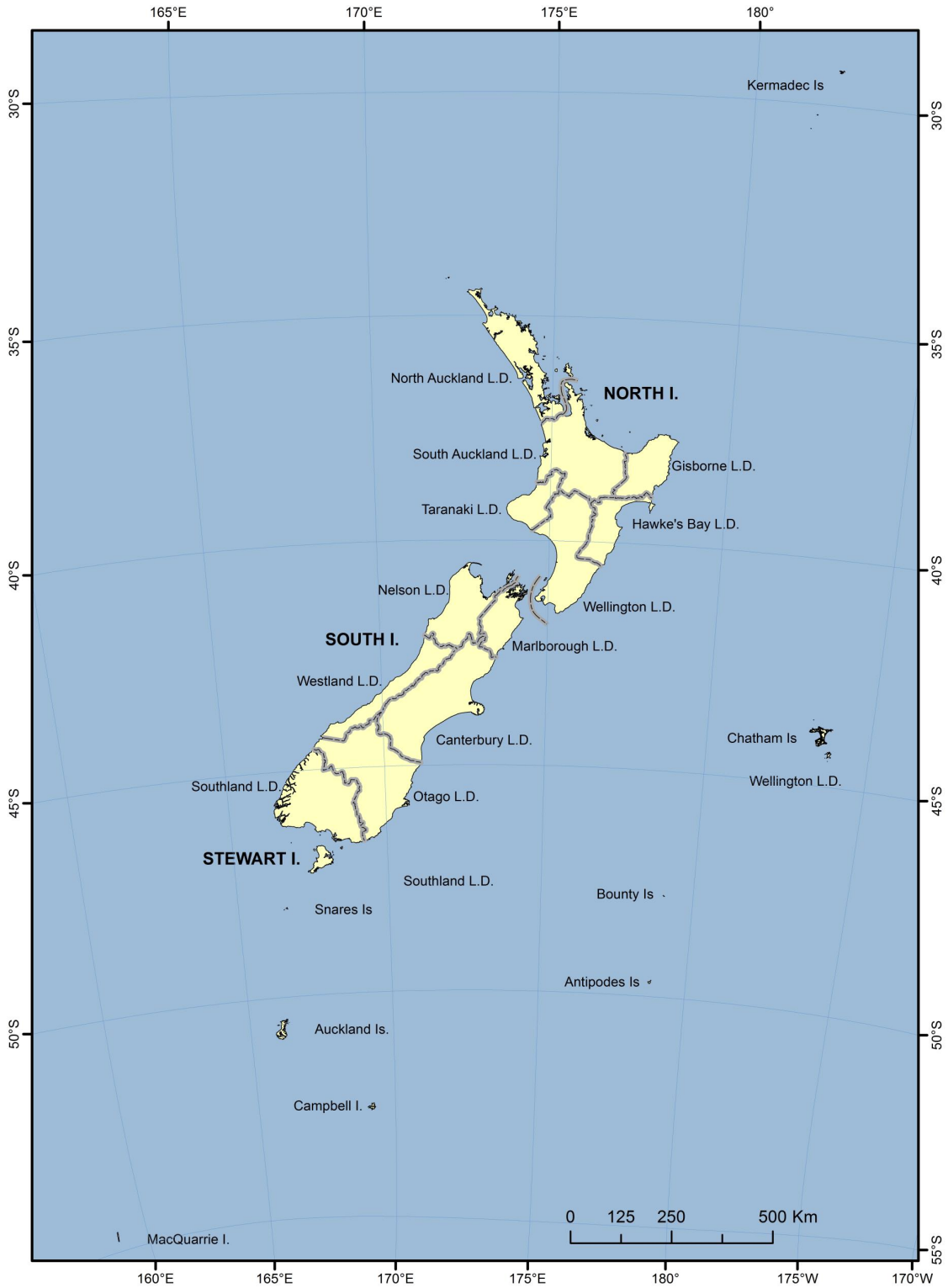
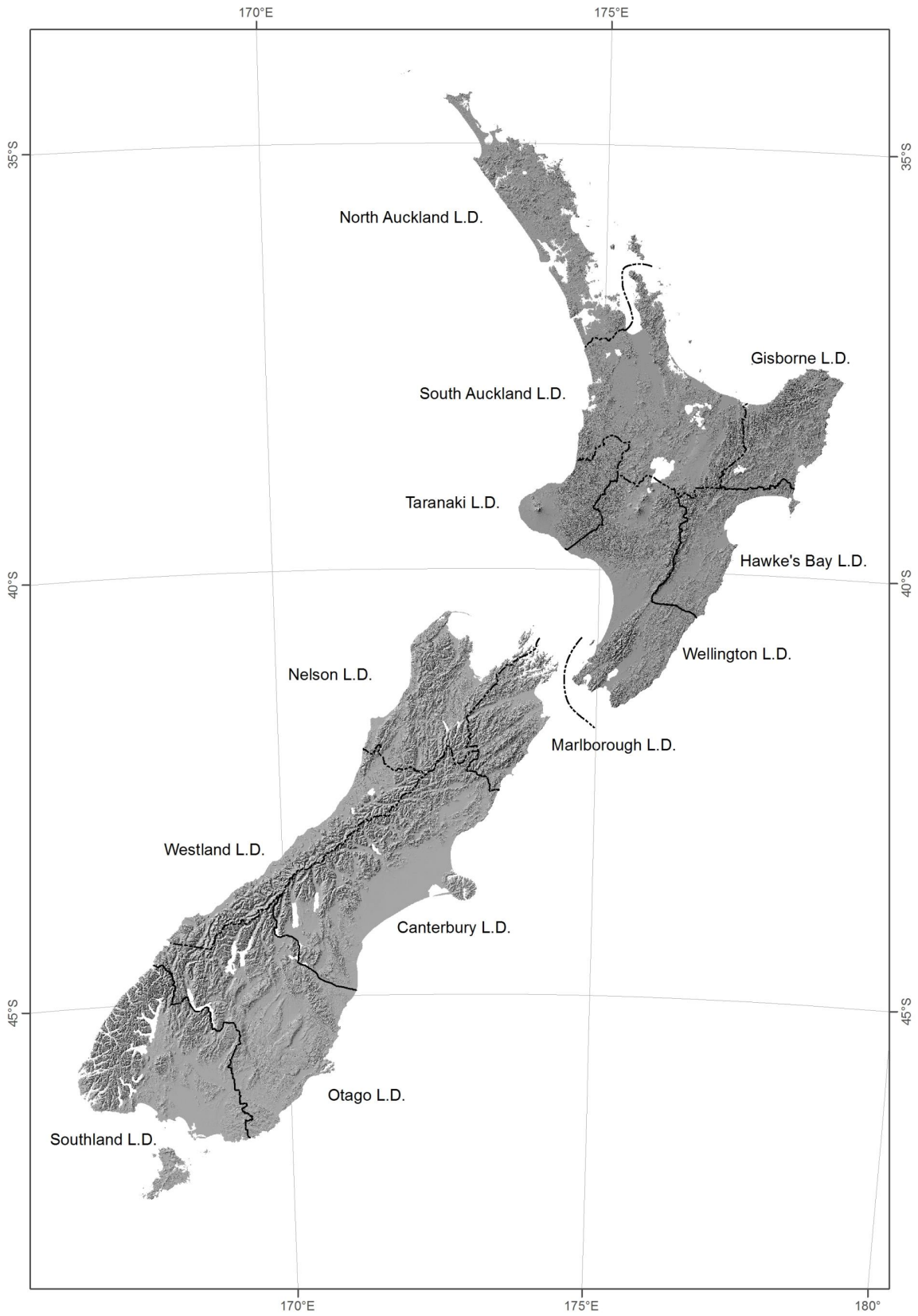


Plate 1: *Pulchrinodus*. A-I: *P. inflatus*. A, habit, moist. B, portion of shoot, dry. C, stem cross-section. D, leaf apex. E, leaves. F, laminal cells from near base of acumen. G, mid laminal cells. H, detail of leaf base. I, alar cells. Drawn from A.J. Fife 11139, CHR 515101.



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.

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Cardot **2**

Hypnum inflatum Hook.f. & Wilson **2**

Pulchrinodaceae **1, 2, 2**

Pulchrinodus B.H.Allen 2-4, **2, 8**

Pulchrinodus inflatus (Hook.f. & Wilson)
B.H.Allen **1, 2, 2**

Image Information

Image
Plate 1
Map 1
Map 2

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