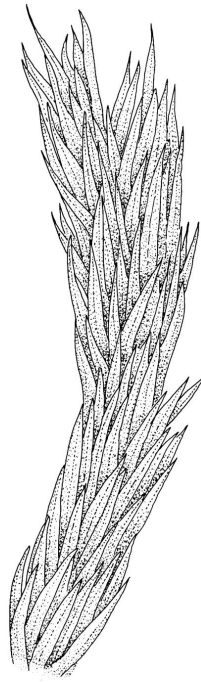




FLORA OF NEW ZEALAND
MOSSES

TIMMIACEAE



A.J.FIFE

Fascicle 29 – OCTOBER 2016

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Cover image: *Timmia norvegica*, shoot. Drawn by Rebecca Wagstaff from A.J. Fife 8478, CHR 464718.

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Introduction

The Timmiaceae consist of the single genus *Timmia*, which is interpreted in its most recent taxonomic revision to include four species and two infraspecific taxa. *Timmia* is largely restricted to higher latitudes and montane sites in the northern hemisphere. The only southern hemisphere records of this genus are a handful of collections of *T. norvegica* from high elevation calcareous rock on the Mt Owen and Mt Arthur Ranges of Nelson L.D. The endostome of the species of *Timmia* is unique, and consists of 64 often clustered cilia arising from a high basal membrane, and often apically fused. The New Zealand material, however, lacks sporophytes as well as both male and female gametangia. The family is retained in its own order and subclass within the class Bryopsida in some modern classifications.

Timmiaceae

Taxonomy: The family is monogeneric, with the features of the genus *Timmia* described below.

The endostome of *Timmia* is very unusual, if not unique among mosses. Brassard (1979) described it as having a “more or less regular arrangement of nodose cilia arising from the 64 upper cells of the basal membrane”.

The genus is retained in its own family, order, and subclass in the classification of Goffinet et al. (2009).

***Timmia* Hedw., *Sp. Musc. Frond.*, 176 (1801), nom. cons.**

Type taxon: *Timmia megapolitana* Hedw.

Plants robust, forming dull, green or yellow-green turves. **Stems** erect or creeping, with brown, papillose rhizoids, in cross-section with a central strand and lacking thin-walled cortical cells. **Leaves** in 8 rows, of uniform length throughout or longer and crowded at stem apices, erect to somewhat reflexed from a sheathing base, with a distinct limb and base, linear-lanceolate, incurved when dry, channelled or tubular, not bordered, ± toothed, keeled; **costa** stout, strongly delimited, ending at the apex, often toothed above on abaxial surface, in cross-section mostly with 2 stereid bands. **Laminal cells** (of limb) unistratose, green, small, rounded-quadrangle or rounded-hexagonal, mammillose adaxially, plane or mammillose abaxially; **cells of the sheath** lacking chlorophyll, pale or pigmented, mostly porose, sometimes papillose abaxially, elongate-rectangular to linear, narrower at margin.

Dioicous or **autoicous**. **Perichaetial leaves** little differentiated. **Perigonia** with filiform paraphyses. **Setae** terminal, elongate, single; **capsules** inclined, horizontal to pendent, oblong-ovoid from a short neck, brown, thick-walled, not or scarcely striate when moist, often furrowed when dry; **stomata** superficial, restricted to the neck and lower half of the urn; **annulus** well-developed, mostly revoluble; **operculum** hemispheric, usually ± apiculate. **Peristome** double, inserted far below the mouth and bound to it by a membrane; **exostome teeth** fused basally, broadly linear-lanceolate, abruptly reflexed in lower half when dry and the tips inflexed-horizontal, seldom perforate or split at apices, flat, in lower half yellow and punctate-cross-striate, in upper half whitish and coarsely vertically barred, with numerous lamellae; **endostome** free, ± as long as the teeth, yellow, with a high, keeled basal membrane dissected into 64 cilia that are often clustered in groups of 3–5 and fused at or near their apices and sometimes appendiculate adaxially. **Calyptra** cucullate, often clasping at its base and remaining attached to the upper seta at capsule maturity. **Spores** spherical, yellowish, almost smooth.

Taxonomy: *Timmia* is a small genus largely restricted to higher latitudes in the northern hemisphere, with the exception of the N.Z. records of *T. norvegica*. The genus was interpreted to include four species and two infraspecific taxa by Brassard (1979, 1980, 1984).

According to Crum & Anderson (1981) the “leafy plants are relatively coarse and somewhat resemble a *Polytrichum* when moist because of leaves spreading from a sheathing base. Of course, the costa is narrow and has no lamellae on the upper surface; in addition the filamentous structure of the endostome is unique.”

Etymology: The genus was named by Hedwig in honour of Joachim Christian Timm (1734–1805), a German apothecary and cryptogamic botanist.

***Timmia norvegica* J.E.Zetterst., *Öfvers. Kongl. Vetensk.-Akad. Förh.* 19: 364 (1862)**

Lectotype: Norway. (Designated by Brassard 1979.) Not seen.

Plants yellow-brown, forming turves. **Stems** unbranched, to c. 30 mm, sparsely beset with very coarsely papillose brown rhizoids. **Leaves** usually longer and slightly more crowded near stem apices, 3.5–7.0 × c. 0.8 mm, moderately crisped when dry, erect-spreading when moist, broadly lanceolate, acute, coarsely and bluntly serrate in upper portion of limb, with a moderately defined upper limb and a lower sheath that occupies 1/8 to c. 1/4 the leaf and is pale in upper leaves but dark red-brown in lower leaves; **upper laminal cells** (mid limb) rounded-quadrangle, 9–15 × 7–9 µm, strongly mammillose adaxially, plane abaxially; **cells of the sheath** c. 60–100 × 12 µm, weakly porose, smooth adaxially, abaxially with 2–5 large (c. 6–10 µm diam.), round, and verrucose papillae over lumens, narrower and not or less distinctly papillose at margins, gradually merging with cells of the limb; **cells at base of sheath** fragile and hyaline in a single band; **costa of limb** adaxially covered with short-rectangular

cells that are mammillose (prorate) at upper ends, abaxially covered with longer (c. 15–30 μm), weakly-projecting or non-projecting cells, teeth at apex absent or obscure, in cross-section with adaxial cells strongly mammillose, a single row of guide cells, and two large stereid bands; **costa of sheath** adaxially covered with long rectangular (40–54 \times 9–15 μm), smooth cells, abaxially with long rectangular, weakly mammillose cells, in cross-section with adaxial cells plane, abaxially cells weakly bulging, a single row of guide cells, a small adaxial and a large abaxial stereid band.

Diocious. Neither male nor female gametangia observed in N.Z. material.

Illustrations: Plate 1. Smith 2004, fig. 161, 5–8.

Distribution: SI: Nelson (Mt Arthur Range, Mt Owen Range).

Bipolar. Widespread at higher latitudes in the northern hemisphere and extending southward as far as the island of Newfoundland and to montane sites in Colorado (Brassard 1979).

Notes: On humus and marble/limestone rubble in the calcareous mountains of Nelson L.D., where it ranges from 1200 to at least 1650 m elevation (but recorded from “c. 1800 m” by Horton & Bartlett (1983)). Associated mosses include *Bartramia papillata*, *Amblystegium varium*, and *Distichium capillaceum*. Horton & Bartlett (1983) cited *Encalypta rhaptocarpa*, *Tortella fragilis*, *Isopterygium pulchellum* and *Bryoerythrophyllum recurvirostrum* as associates.

Brassard (1984) uses primarily the width of the laminal limb cells and presence of papillae on the abaxial (dorsal) surface of the limb costa to distinguish between the var. *norvegica* and the var. *excurrens*. The laminal limb cells in N.Z. material are generally 7–9 μm wide (thus according with the dimensions given by Brassard for var. *excurrens*). The abaxial surface of the limb costa has cells smooth or nearly so in the middle and only weakly projecting at the side of the costa. There are no teeth clearly visible near the abaxial apex. N.Z. material is thus difficult to assign confidently to either of the two varieties recognised by Brassard (1984) using his key, as noted by Horton & Bartlett (1983). The distinction between the two varieties is of little significance in a N.Z. context as it is clear that our material is referable to *T. norvegica* s.l.

Etymology: The species epithet refers to the Norwegian type locality.

References

- Brassard, G.R. 1979: The moss genus *Timmia*. 1. Introduction, and revision of *T. norvigica* and allied taxa. *Lindbergia* 5: 39–53.
- Brassard, G.R. 1980: The moss genus *Timmia*. 2. Sect. *Timmiaurea*. *Lindbergia* 6: 129–136.
- Brassard, G.R. 1984: The moss genus *Timmia*. 3. Sect. *Timmia*. *Lindbergia* 10: 33–40.
- Crum, H.A.; Anderson, L.E. 1981: *Mosses of Eastern North America*. Columbia University Press, New York.
- Goffinet, B.; Buck, W.R.; Shaw, A.J. 2009: Morphology, anatomy, and classification of the Bryophyta. In: Goffinet, B.; Shaw, A.J. (ed.) *Bryophyte Biology*. Edition 2. Cambridge University Press, Cambridge. 55–138.
- Hedwig, J. 1801: *Species Muscorum Frondosorum descriptae et tabulis aeneis lxxvii coloratis illustratae*. Barth, Leipzig.
- Horton, D.G.; Bartlett, J.K. 1983: The genus *Timmia* Hedwig: a bipolar disjunct. *Bryologist* 86: 370–373.
- Smith, A.J.E. 2004: *The Moss Flora of Britain and Ireland*. Edition 2. Cambridge University Press, Cambridge.
- Zetterstedt, J.E. 1862: Tvenne mossarter, beskrifna. *Öfversigt af Kongl. Vetenskaps-Akademiens Förhandlingar* 19: 363–365.

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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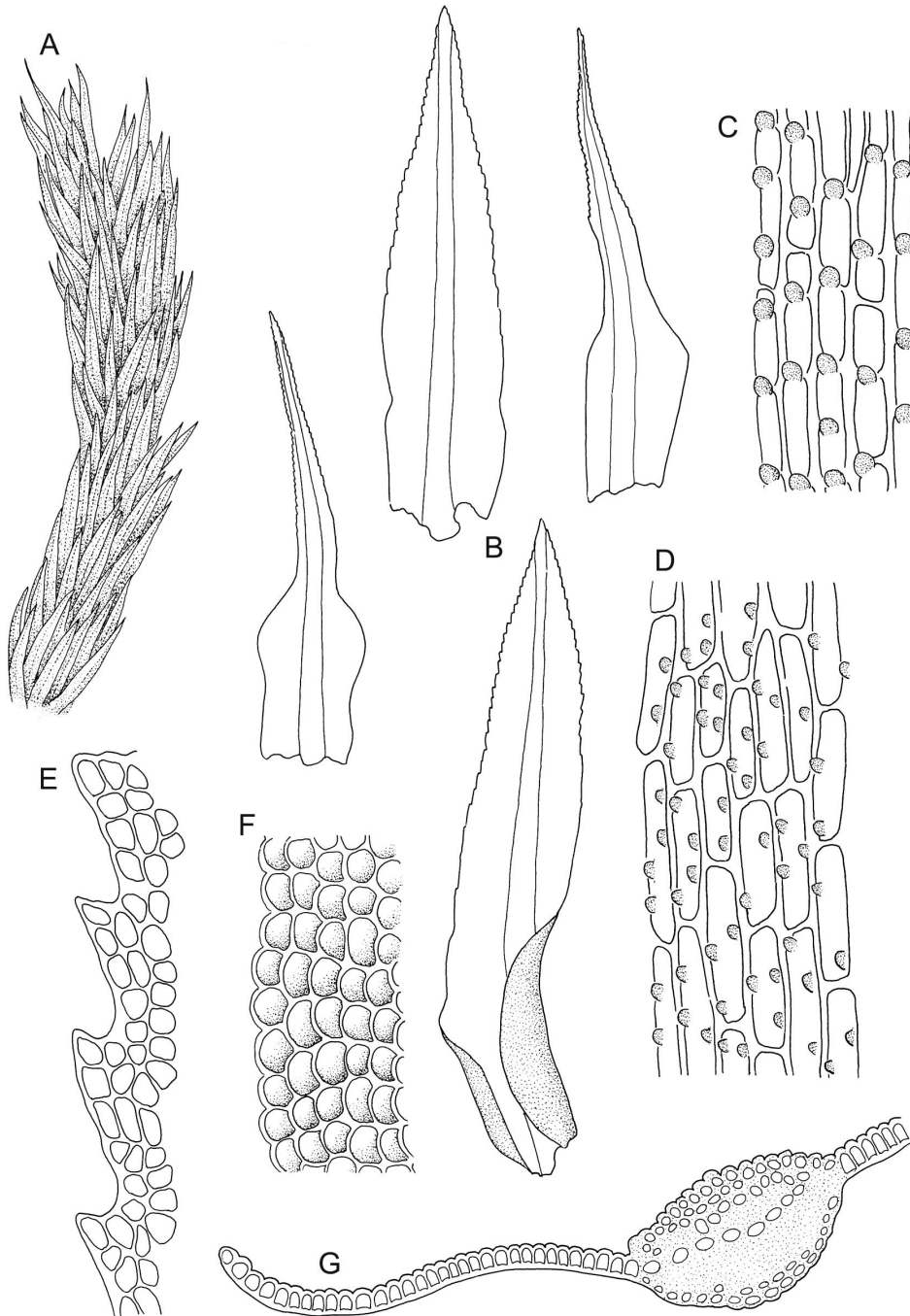
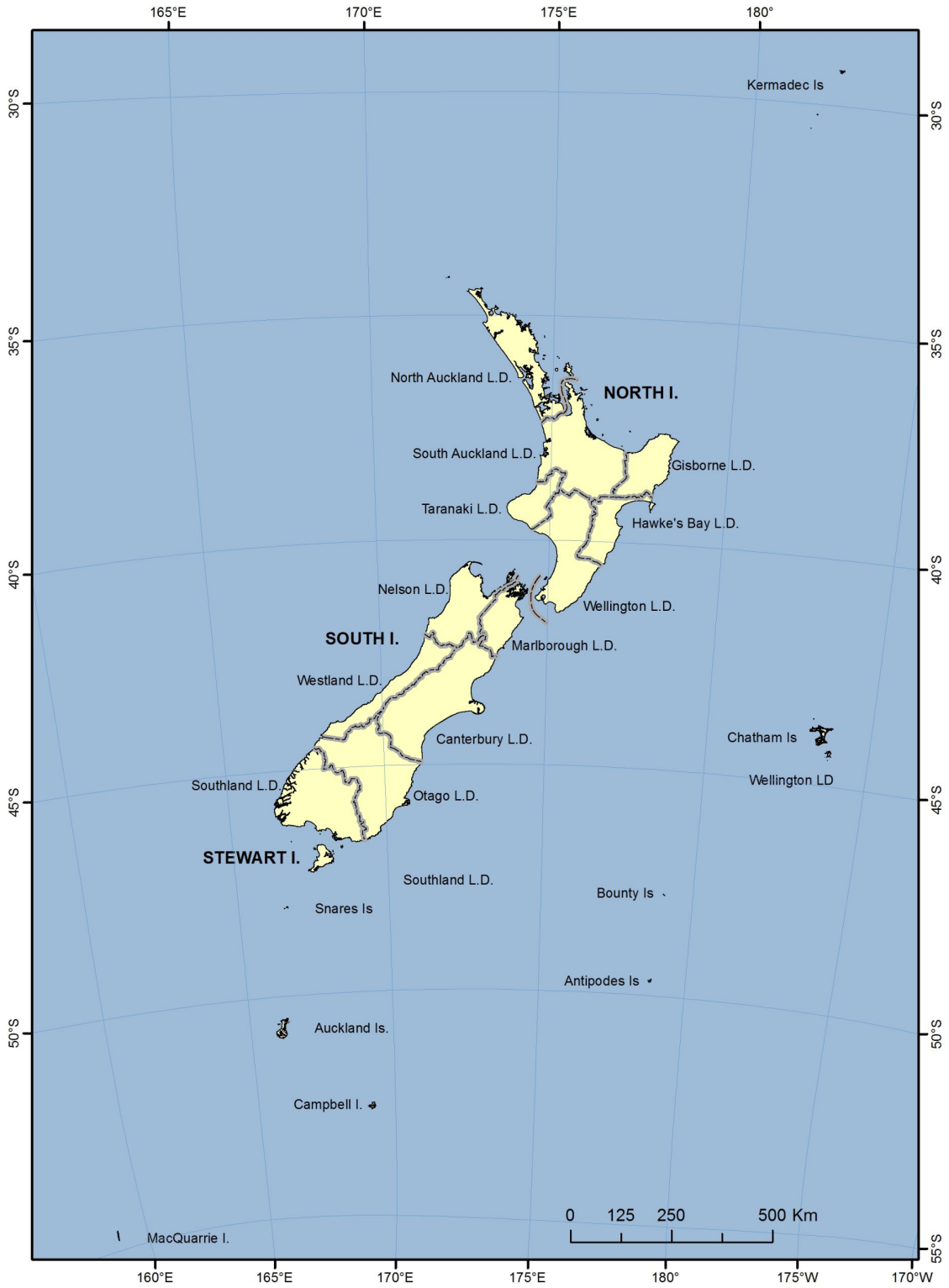
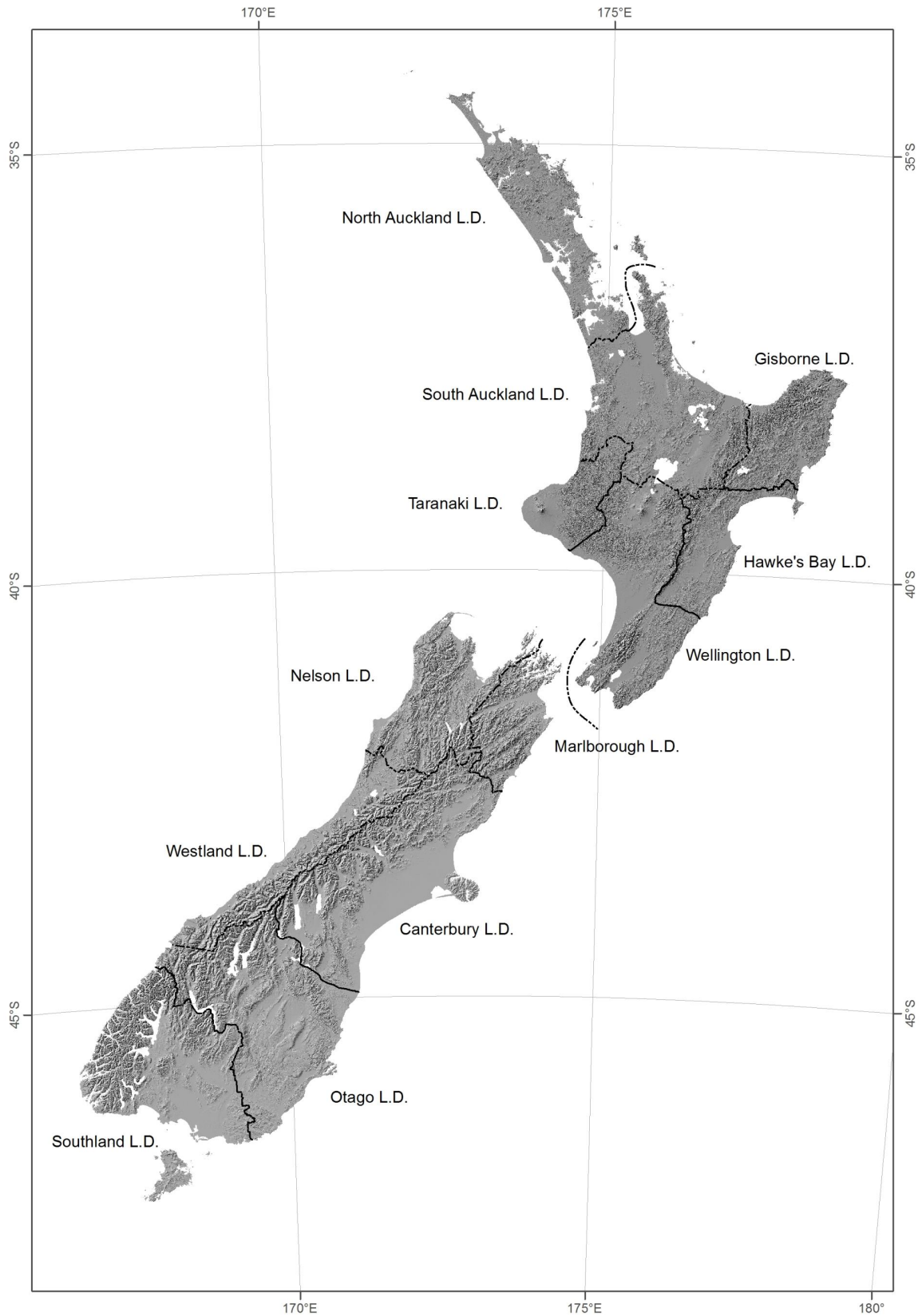


Plate 1: *Timmia*. A–G: *T. norvegica*. A, shoot. B, four leaves. C, adaxial cells of the costa, near limb base. D, laminal cells of the sheath, abaxial surface. E, upper laminal cells at margin of limb, adaxial surface. F, mid laminal cells of limb, adaxial surface. G, cross-section of lower limb including costa. Drawn from A.J. Fife 8478, CHR 464718.



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

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Timmiaceae **2**

Image Information

Image
Plate 1
Map 1
Map 2

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