



**FLORA OF NEW ZEALAND**  
**MOSSES**

**ENTODONTACEAE**



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**A.J. FIFE**

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Cover image: *Entodon plicatus*, habit with capsules. Drawn by Rebecca Wagstaff from *B.H. Macmillan 84/51*, CHR 506854.

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## Introduction

The Entodontaceae are a pleurocarpous family of four genera, with the eponymous genus by far the most species-rich. *Entodon* is a genus of c. 130 species, best developed on tree trunks and rock in tropical highlands, but extending into temperate parts of both southern and northern hemispheres. Only one species, *E. plicatus*, occurs in N.Z. It is an attractive, bright green, lustrous, and complanate plant with cuspidate shoot apices, no apparent costae, and rather large, erect, and narrowly cylindrical capsules, which grows on rock and exposed roots in forests of eastern regions. N.Z. material has formerly been treated as an endemic species (*E. truncorum*), but that taxonomic interpretation is rejected here. In some parts of its N.Z. range *E. plicatus* shows a distinct preference for areas with calcareous bedrock, as do many of its congeners in other regions. The bulk of *E. plicatus* N.Z. collections are from Canterbury and Otago, and it is documented from fewer than 10 North I. collections, mostly from near Lake Waikaremoana.

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## Entodontaceae

Buck (1994) provided a family description and none is given here. He defined the family in terms of “leaves with a short, double costa and well-differentiated alar cells; the capsules [are] erect with a double peristome inserted well below the mouth; exostome teeth [which] consist of relatively broad, striate to papillose plates mostly joined along a straight median line; on the back surface the lamellae are non-projecting”.

**Taxonomy:** Buck (1980) clarified the limits of the Entodontaceae and recognised four genera: *Entodon*, *Erythrodontium*, *Mesonodon*, and *Pylaisiobryum*. *Entodon* is by far the largest genus. *Erythrodontium* is a predominantly South American and African genus of about 17 species (Buck 1994, p. 960), while *Mesonodon* includes two species and *Pylaisiobryum* is monotypic. *Mesonodon flavescens* and two species of *Entodon* have been recorded from Australia (Buck 1990). Only one species of *Entodon* occurs in N.Z.

### *Entodon* Müll.Hal., *Linnaea* 18: 704 (1845 [1844])

**Type taxon:** *Entodon fissidens* Müll.Hal.

Elements in the following description are taken from Buck (1990).

**Plants** slender to moderately robust, forming shiny, flattened mats. **Stems** mostly creeping, irregularly to sub-pinnately branched with relatively short, terete or complanate branches; in cross-section with a layer of small, thick-walled cells surrounding larger and thin-walled cells and a distinct central strand. **Stem and branch leaves** similar, mostly crowded, oblong-lanceolate to oblong-ovate, obtuse to acuminate, usually acute, concave, not decurrent, serrulate above or less commonly entire; **margins** plane or ± reflexed near base; **upper laminal cells** linear, straight to ± sinuose, smooth, not porose, commonly shorter at extreme apex; **marginal cells** not differentiated; **basal cells** shorter, usually porose; **alar cells** quadrate to subquadrate (inflated in N.Z. material), with primordial utricles, forming large triangular or ± auriculate groups. **Costae** double, very short or extending to near mid leaf, occasionally almost absent. **Pseudoparaphyllia** foliose.

**Autoicous** or **rarely dioicous**. **Perichaetia** scattered on stem and branches, more numerous than perigonia; **perichaetial leaves** lanceolate to oblong-lanceolate from a sheathing base, erect or reflexed. **Perigonia** gemmiform, scattered on stem and branches. **Setae** elongate, yellow or red; **capsules** cylindrical, erect and symmetric or rarely suberect; **exothecial cells** ± irregularly rectangular; **stomata** few, restricted to extreme base of urn; **columella** commonly exerted; **annulus** present or absent; **operculum** high-conic to obliquely rostrate. **Peristome** double; **exostome teeth** inserted well below the mouth, on outer surface with a nearly straight median line and broad plates, on inner surface not or slightly trabeculate and often perforate; **endostome** with a low basal membrane, the segments linear, keeled and perforate, or rarely rudimentary; **cilia** lacking or rarely rudimentary. **Calyptra** cucullate, mostly naked. **Spores** spherical, finely or coarsely papillose.

**Taxonomy:** The genus is traditionally divided into two subgenera (sometimes termed sections, as in Brotherus (1925)) based primarily on sporophytic characters, especially seta colour and the presence or absence of an annulus. The N.Z. species belongs to the subgenus *Entodon* (=sect. *Xanthopus* Broth.) according to the criteria given by Buck (1990). Buck's (1990) study of Australian, Melanesian, and Oceanian taxa of *Entodon* specifically excluded N.Z. material.

**Distribution:** *Entodon* is a genus of c. 130 species (Buck 1990) best developed in tropical highlands but extending into temperate regions of both hemispheres. One species occurs in N.Z.

### *Entodon plicatus* Müll.Hal., *Linnaea* 18: 706 (1845)

Type: India. Not seen.

= *Entodon truncorum* Mitt. in Hooker, *Handb. N. Zeal. Fl.*, 467 (1867)

Holotype: N.Z., Otago, *J. Hector* 16, NY 267936! Isotype: BM-Hooker!

= *Entodon beckettii* Müll.Hal. in Dixon, *Bull. New Zealand Inst.* 3: 277 (1927) *nom. inval.*

Type: N.Z., Canterbury, Peel Forest, 21 May 1893, *T.W.N. Beckett* 387B, CHR 623645!

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**Plants** moderately robust, bright green, occasionally bronze, and lustrous when fresh, becoming yellow-green in herbarium, forming loosely interwoven and flattened mats. **Stems** c. 40–70 mm, irregularly to sub-pinnately branched, in cross-section oval, with 2–3 layers of firm-walled, pigmented cortical cells and an ill-defined but large central strand. **Shoots** complanate or sometimes homomallous, usually tapered to a cuspidate and  $\pm$  secund apex, c. 2.0–3.0 mm wide. **Branches** mostly short and cuspidate-hooked at tips. **Stem and branch leaves** strongly complanate or  $\pm$  homomallous, oblong-lanceolate, slightly auriculate at base, acute and often slightly curved to one side at apex, strongly concave, entire except for a few small apical teeth, c. 1.8–2.2  $\times$  0.8–0.9 mm; **margins** plane or loosely incurved; **upper laminal cells** weakly sinuose, mostly 78–115  $\times$  5–6  $\mu$ m, becoming shorter at apex; **basal cells** shorter, broader, and  $\pm$  porose to form a broad but ill-defined band, which grades into the alar group; **alar cells** inflated, broadly oblong and rather thin-walled, not porose, the largest c. 35  $\times$  20  $\mu$ m, the cell contents persisting as a primary utricle when dry, forming a large, moderately defined, concave, and  $\pm$  auriculate group, mostly extending 8–10 cells up the margin and to 1/3 the basal width of the leaf. **Costae** absent or very faint, short, and double.

**Autoicous. Perichaetia** with outer leaves widely spreading, the inner narrowly lanceolate, apparently elongating after fertilisation and weakly sheathing the seta base. **Perigonia** scattered on stems and branches, axillary, gemmiform, often sparse, with ovate and widely spreading bracts, numerous antheridia, and filiform paraphyses. **Setae** yellow or pale-brown, straight or weakly flexuose, 10–15 mm, twisted to the left; **capsules** erect and narrowly cylindrical, not constricted below mouth, 3–4  $\times$  0.7–0.9 mm, smooth and scarcely altered when dry; **exothelial cells** irregularly oblong, firm-walled; **stomata** superficial, sparse and restricted to capsule base; **annulus** not seen; **operculum** obliquely rostrate. **Exostome teeth** red, c. 500  $\mu$ m long and inserted c. 75  $\mu$ m below the mouth, on outer surface with a nearly straight median line and broad plates, striate, on inner surface scarcely trabeculate; **endostome** arising from a very low basal membrane, segments linear,  $\pm$  equal the teeth, narrowly perforate, keeled, and smooth; cilia lacking. **Calyptra** smooth, c. 3 mm. Spores 15–18  $\mu$ m green, finely papillose.

**Illustrations:** Plate 1. Buck 1990, figs 6–10; Whittier 1976, fig. 89 (as *E. solanderi*).

**Taxonomy:** Study of Buck's (1990) detailed description and illustration of *E. plicatus* and examination of a suite of Sri Lankan, Australian, and Polynesian collections confirms that N.Z. *E. truncorum* is identical to the widespread *E. plicatus*; Buck's (1990, p. 701) suggestion that N.Z. material differs from extra-N.Z. material is rejected here.

Townsend (1991) provided notes on *Entodon* in India and Sri Lanka and proposed that *E. plicatus* Müll.Hal. should be placed in the synonymy of the widespread American species *E. macropodus* (Hedw.) Müll.Hal. However, Buck (pers. comm., 10 Aug. 2002), who has worked extensively on this family, considers these species to differ by peristome characters and thus Townsend's synonymy is not accepted here.

**Distribution:** NI: Gisborne (Lake Waikaremoana), Hawke's Bay (Tukituki River), Wellington (Wairarapa); SI: Nelson, Marlborough, Canterbury, Otago, Southland; Ch.

Anomalous. Mainland Australia\*, Rarotonga\*, Sri Lanka\*, India\*. Also reported (Buck 1990) from Mauritius, south-east Asia, East Indies, Philippines, Tasmania, New Caledonia, Fiji, and Hawai'i.

**Habitat:** On a wide range of rocks, exposed roots, and occasionally on logs or tree bases in forested habitats where it can form mats to at least 250 mm diam. Occurring from c. 30 m (Wairarapa, Wellington L.D.) to 1070 m (Red Hills, Marlborough L.D.) elevation. This species is poorly documented on the North I. from whence fewer than 10 collections have been seen, most of them from the Lake Waikaremoana vicinity. It is a relatively common species in the foothills of Canterbury where it occurs mostly on greywacke. However, in Marlborough, Nelson, and Southland L.D. it is usually associated with limestone or marble. Occurring in a variety of forest types and frequently associated with *Acrocladium chlamydophyllum*, *Camptochaete* spp., *Echinodium hispidum*, and *Rhacocarpus purpurascens*. Dixon (1927, p. 277) recorded this species (as *E. truncorum*) only from Canterbury and Otago L.D. Although it is now known to be more widespread and to occur on both main islands, approximately 2/3 of the known N.Z. collections are still from these two Land Districts.

**Recognition:** Populations in which the leaves are decidedly homomallous could, if sterile, be confused in the field with rather large forms of *Hypnum cupressiforme*. Usually, however, the present species has leaves that are only secund at the stem-branch apices in contrast to the markedly falcate-secund leaves of the *Hypnum*. The nature of the alar cells in the two species is very different, as is the sexuality and the nature of the sporophyte.

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**Notes:** Stems of *E. plicatus* are relatively robust and variably complanate; many populations have leaves only weakly ranked and decidedly homomallous. In terms of leaf cell and sporophyte characters, however, the species is less variable. The oblong-lanceolate, weakly doubly costate or ecostate leaves, which are asymmetric and denticulate at the apex, are distinctive, as are the large groups of enlarged and oblong alar cells. The commonly-produced erect and narrowly cylindrical capsule with its distinctive double peristome makes this species readily recognisable in N.Z. The exostome teeth have broad, striate plates separated by a nearly straight median line and lack adaxial trabeculae. The endostome with a very low membrane, elongate segments, and no cilia provides further distinction.

**Etymology:** The meaning of the epithet, as applied to this species, is unclear.



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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
<i>hom. illeg.</i>	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
<i>nom. cons.</i>	conserved name ( <i>nomen conservandum</i> )
<i>nom. dub.</i>	name of doubtful application ( <i>nomen dubium</i> )
<i>nom. illeg.</i>	name contrary to the rules of nomenclature ( <i>nomen illegitimum</i> )
<i>nom. inval.</i>	invalid name ( <i>nomen invalidum</i> )
<i>nom. nud.</i>	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

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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
x	times
>	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.

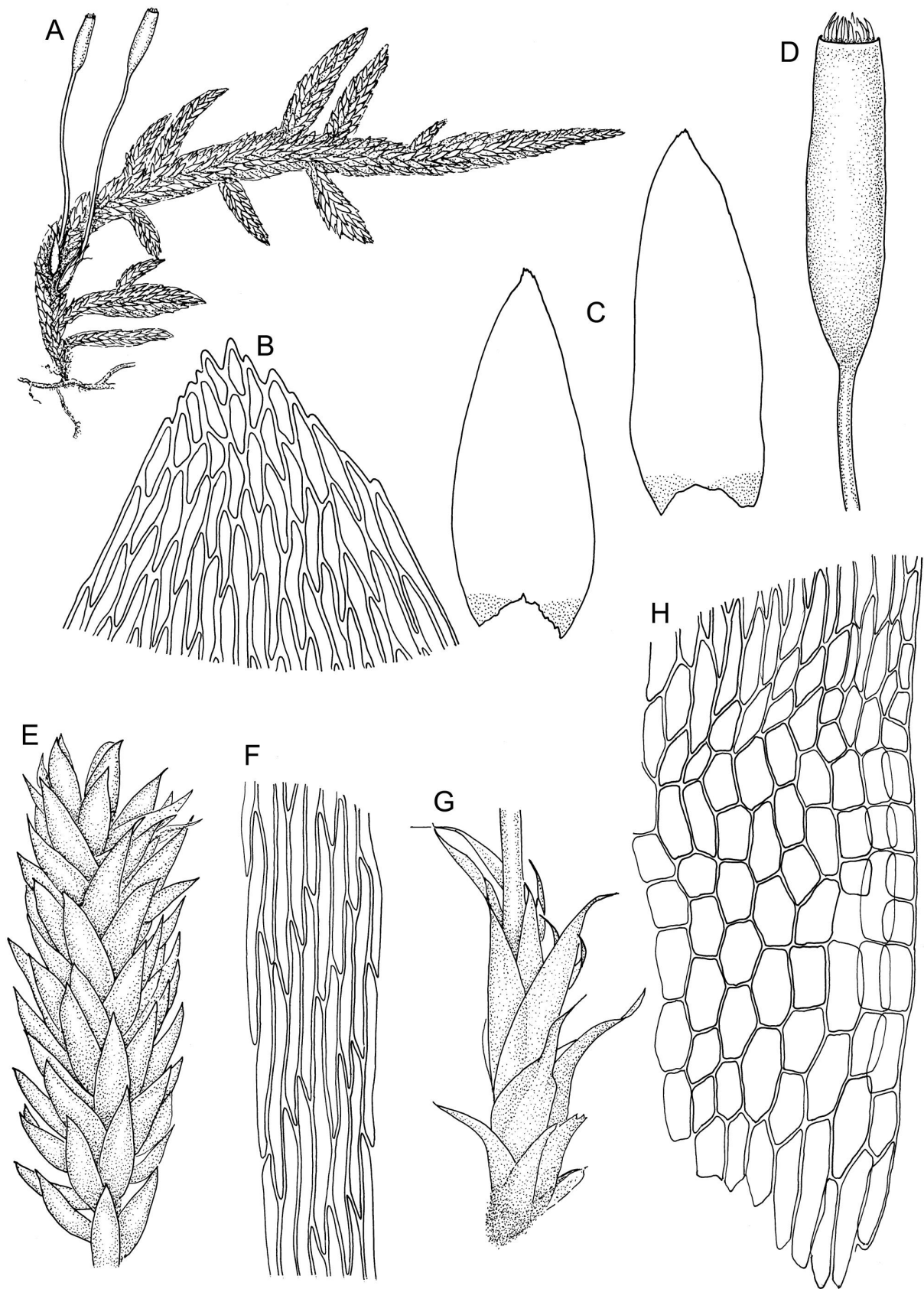
Abbreviations for Herbaria follow the standard abbreviations listed in *Index Herbariorum*.

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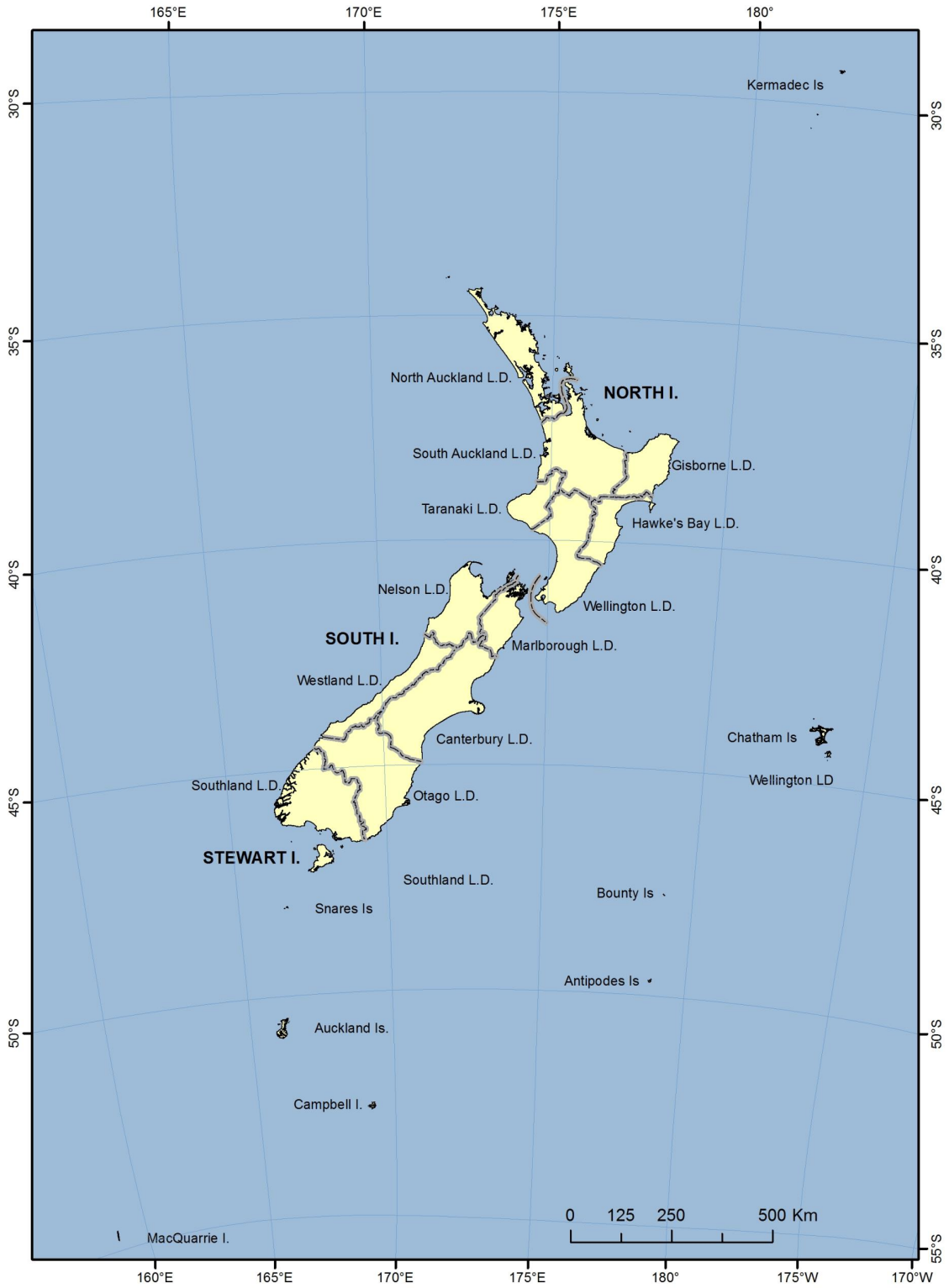
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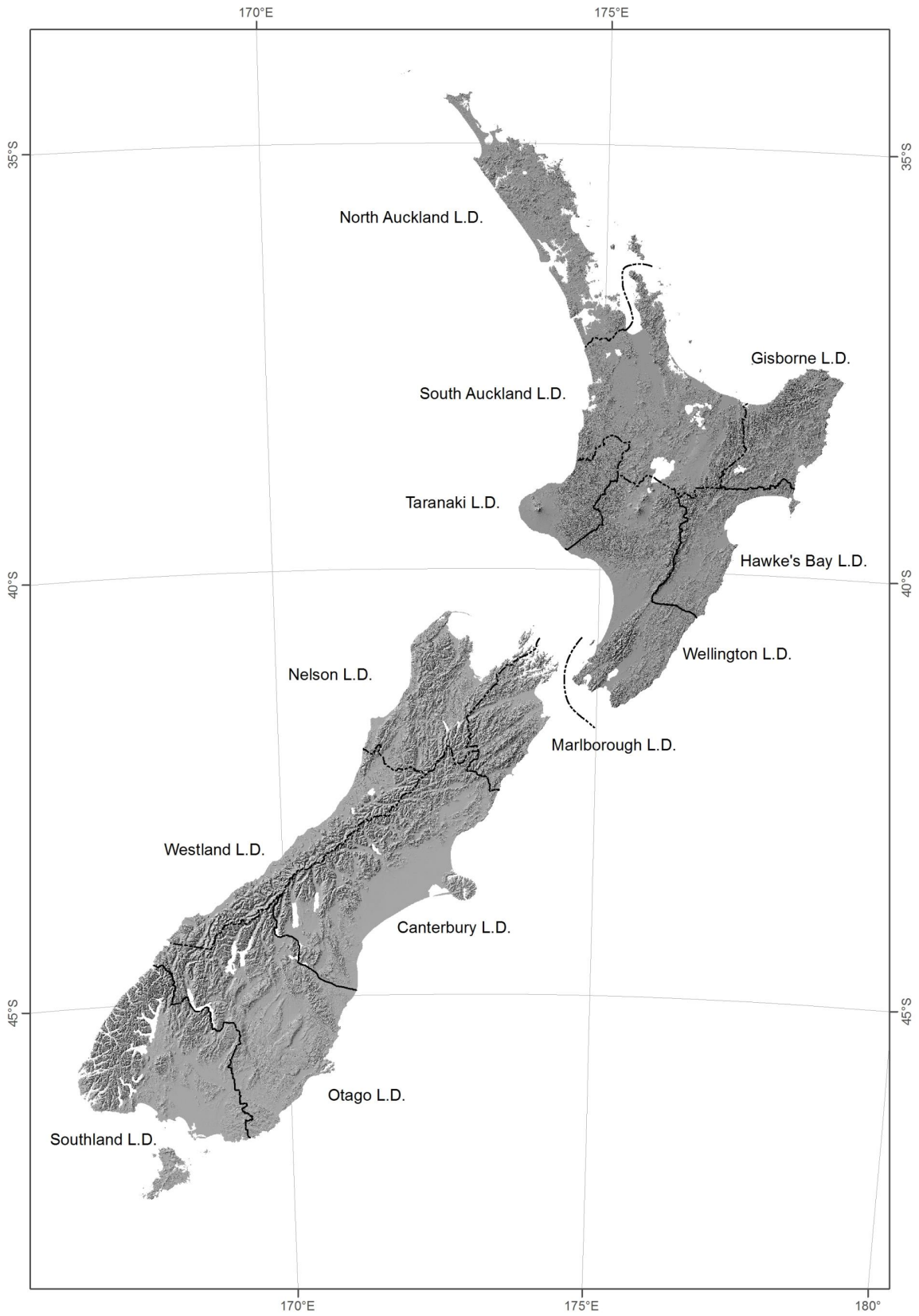
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**Plate 1: *Entodon*. A–H: *E. plicatus*.** A, habit with capsules. B, leaf apex. C, leaves. D, capsule. E, branch detail. F, upper laminal cells. G, perichaetium. H, alar cells. Drawn from *B.H. Macmillan 84/51*, CHR 506854.



**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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## Image Information

**Image**  
Plate 1  
Map 1  
Map 2

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