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LYGODIACEAE

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Cover image: *Lygodium articulatum*, mature frond with sterile pinnae climbing a tree fern trunk.

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Contents

Introduction

The family Lygodiaceae is represented in New Zealand by just one genus, with one endemic species, confined to the northern part of the North Island. *Lygodium* has an unusual growth form with fronds of indeterminate growth. *Lygodium articulatum* twines and climbs through trees and scrub in northern forests, and is one of the few truly climbing ferns in New Zealand.

Lygodiaceae M.Roem., *Handb. Allg. Bot. 3,* 520 (1840)

Type taxon: *Lygodium* Sw.

Climbing ferns. Rhizomes creeping, bearing septate hairs. Fronds monomorphic, not articulated to rhizome; juvenile fronds of determinate growth; adult fronds twining and climbing with a wiry rachis of indeterminate growth. Stipes glabrous or hairy. Pinnae arising alternately on rachis, dividing pseudo-dichotomously with a dormant bud in the axil, glabrous or sparsely hairy. Fertile and sterile segments often markedly dimorphic. Veins free or reticulate without free included veinlets. Sporangia borne individually in two rows on marginal lobes of the fertile segments, not in sori, each covered by an antrorse subtending indusium-like flange, asymmetrically ovoid, attached laterally, with the annulus horizontal around the outward-pointing apex, dehiscing by a vertical longitudinal slit; spores maturing ±simultaneously; 128–256 spores per sporangium. Homosporous; spores trilete, tuberculate or verrucate, lacking chlorophyll.

Taxonomy: A family of one genus and about 30 species. Earlier classifications have varied in their treatment of the Schizaeales. Allan (1961) and Kramer (1990) included the Lygodiaceae and Anemiaceae in the Schizaeaceae, whereas Pichi Sermolli (1977) maintained all three as separate families. Three families are now generally recognised within the Schizaeales (Smith et al. 2006; Christenhusz et al. 2011).

Distribution: Distributed throughout tropical and subtropical regions, extending also into a few temperate regions. One species in New Zealand; endemic.

Biostatus: Indigenous (Non-endemic).

Table 1: Number of species in New Zealand within *Lygodiaceae* M.Roem.

Category	**Number**
Indigenous (Endemic)	1
Total	**1**

Recognition: The Lygodiaceae are climbing ferns recognised by their creeping rhizomes bearing septate hairs, adult fronds of indeterminate growth, pseudo-dichotomously branching pinnae, markedly different fertile and sterile segments, sporangia borne on marginal lobes of the segments, not in sori, each sporangium protected by a subtending flange, and a base chromosome number of 29 or 30.

Lygodium Sw., *J. Bot. (Schrader)* 1800: 7, 106 (1801) nom. cons.

Type taxon: *Lygodium scandens* (L.) Sw.

Etymology: From the Greek *lygodes* (twining, pliant), a reference to the climbing fronds.

Climbing ferns. Rhizomes creeping, bearing septate hairs. Fronds monomorphic, not articulated to rhizome; juvenile fronds of determinate growth; adult fronds twining and climbing with a wiry rachis of indeterminate growth. Stipes glabrous or hairy. Pinnae arising alternately on rachis, dividing pseudo-dichotomously with a dormant bud in the axil, glabrous or sparsely hairy. Fertile and sterile segments often markedly dimorphic. Veins free or reticulate without free included veinlets. Sporangia borne individually in two rows on marginal lobes of the fertile segments, not in sori, each covered by an antrorse subtending indusium-like flange, asymmetrically ovoid, attached laterally, with the annulus horizontal around the outward-pointing apex, dehiscing by a vertical longitudinal slit; spores maturing ±simultaneously; 128–256 spores per sporangium. Homosporous; spores trilete, tuberculate or verrucate, lacking chlorophyll.

Distribution: A genus of about 30 species distributed throughout the tropics and subtropics, extending to temperate parts of Japan, China, eastern USA, New Zealand and southern Africa; about nine species in tropical and temperate America, four in Africa, 15 in south-east Asia, four in Australia and seven in the Pacific. One species endemic to New Zealand.

Biostatus: Indigenous (Non-endemic).

Table 2: Number of species in New Zealand within *Lygodium* Sw.

Category	**Number**
Indigenous (Endemic)	1
Total	**1**

Cytology: The base chromosome number in *Lygodium* is given as x = 29, 30 by Smith et al. (2006) with n = 29, 30, 58, and 60, and 2n = 56, 112, 116 and 120 recorded by Kramer (1990).

Lygodium articulatum A.Rich., Voy. Astrolabe, Essai 96, t. 15 (1832)

Lectotype (selected by Brownsey & Perrie 2013): Baie des Îles, Nouvelle Zélande [Bay of Islands, Northland, New Zealand], *Astrolabe*, Herb. A. Richard in Herb. E. Drake, P 00523227!

= *Lygodium gracilescens* Colenso, *Trans. & Proc. New Zealand Inst.* 28: 620 (1896)
Lectotype (selected by Allan 1961): no locality, *Colenso* s.n., WELT P003360!

Etymology: From the Latin *articulatus* (jointed), a reference to the pinnules which are articulated to the costae.

Vernacular names: bushman's mattress; makamaka; mangemange; mākaka

Rhizomes long-creeping; bearing shiny, chestnut-brown, septate hairs, 1.5–3 mm long. Adult fronds of indeterminate growth, twining and climbing to tops of trees. Stipes pale brown, sparsely hairy at base. Rachises pale brown, tough and wiry. Pinnae arising alternately along rachis. Sterile and fertile pinnae, or sometimes sterile and fertile segments on one pinna, markedly dimorphic. Sterile pinnae 60–175 mm long, rarely to 220 mm long; costae branching dichotomously or pseudo-dichotomously 2–4 times, with a sterile bud and long, colourless, acicular hairs present in the axil of the first dichotomy; ultimate segments narrowly ovate or narrowly oblong, 30–120 mm long, or rarely 160 mm long, 5–20 mm wide, apices acuminate, acute or round, margins entire, bases acute to almost truncate, articulated to costae, bright green above, blue-green below, herbaceous, glabrous. Fertile pinnae 35–105 mm long; costae branching pseudo-dichotomously 5–8 times, with a sterile bud and long colourless acicular hairs present in the axil of the first dichotomy; segments ovate, broadly ovate or broader than long, 3–30 mm long, 3–22 mm wide, apices acute or obtuse, deeply dissected, bases attenuate, articulated to costae, glabrous. Veins free. Sporangia arranged on marginal lobes of the fertile segments, 2–18 per sporogenous lobe.

Distribution: North Island: Northland, Auckland, Volcanic Plateau, Gisborne, Taranaki.

Altitudinal range: 0–950 m.

Lygodium articulatum occurs from North Cape, throughout Northland and Auckland, south to the King Country, Kaimai Ranges and the eastern Bay of Plenty. It grows from near sea level, reaching about 740 m on Mt Hereheretaunga near Te Kaha, and 950 m on Mt Te Aroha.

Biostatus: Indigenous (Endemic).

Habitat: Common as a climbing fern in mānuka and kānuka scrub, and in kauri, podocarp and broadleaved forest, in lowland and montane areas of northern New Zealand.

Recognition: *Lygodium articulatum* is easily recognised by its twisting, climbing habit – the only fern of its type in New Zealand. It grows from a long-creeping terrestrial rhizome and produces adult climbing fronds of indeterminate length, which can develop into dense tangles. The markedly different fertile and sterile segments are also very distinctive.

Cytology: n = c. 70 (Brownlie 1961). This is not consistent with the base number of 29 and 30 for *Lygodium* given by Smith et al. (2006), and needs reassessment.

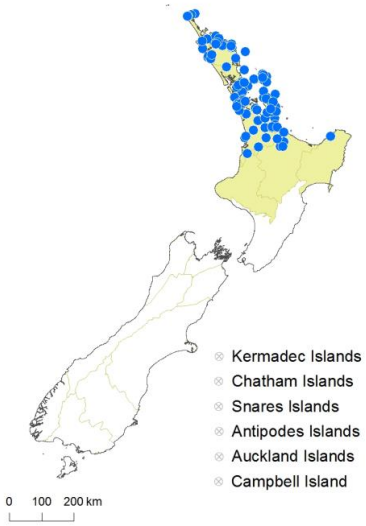

Fig. 1: *Lygodium articulatum* distribution map based on databased records at AK, CHR, NZFRI, WAIK and WELT.

Fig. 2: *Lygodium articulatum*: mature frond with sterile pinnae climbing a tree fern trunk.

Fig. 3: *Lygodium articulatum*: immature frond growing on the forest floor showing dichotomously dividing sterile pinnae.

Fig. 4: *Lygodium articulatum*: dichotomously dividing fertile pinnae with young, developing sporangia on segment tips.

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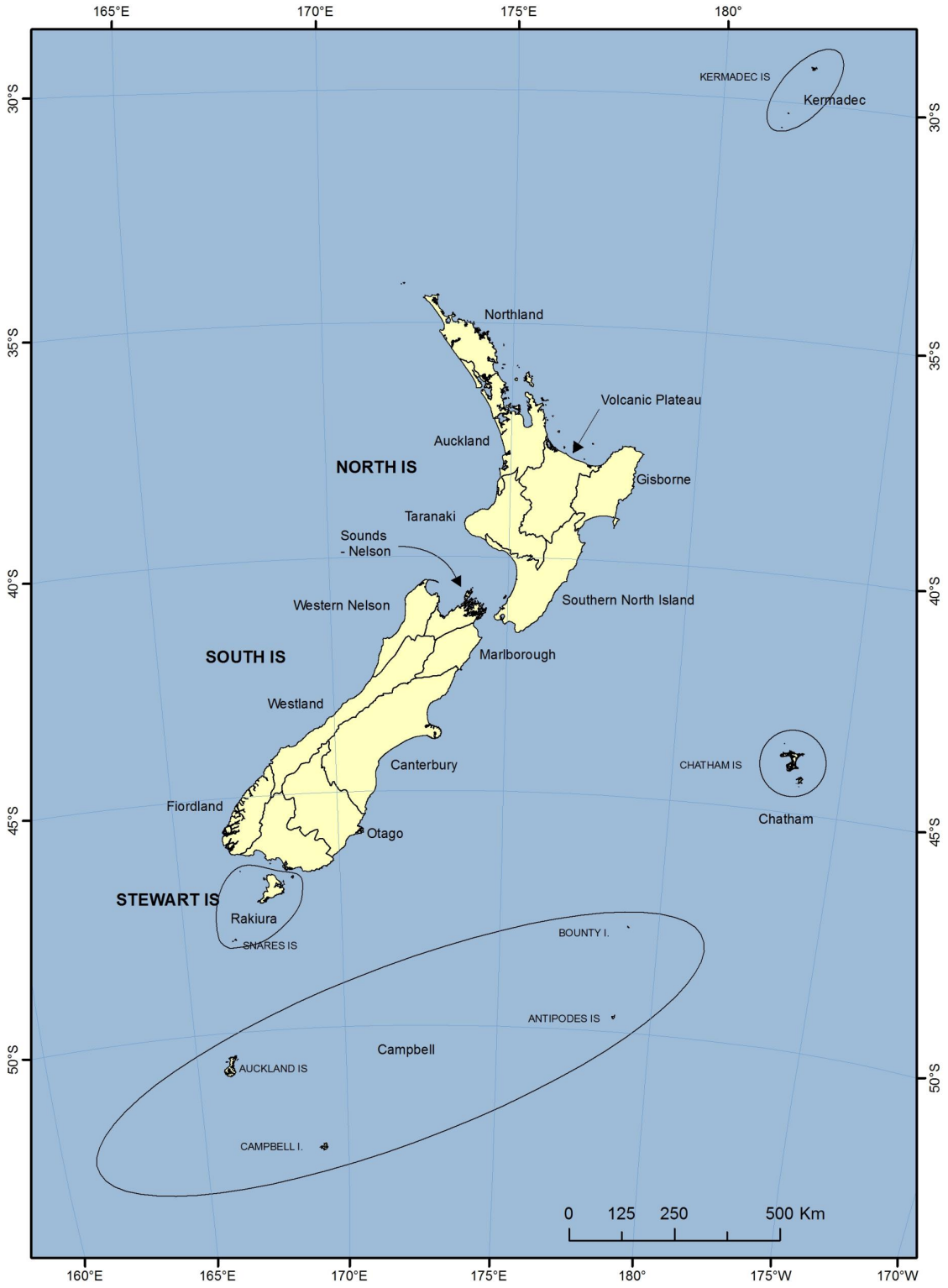
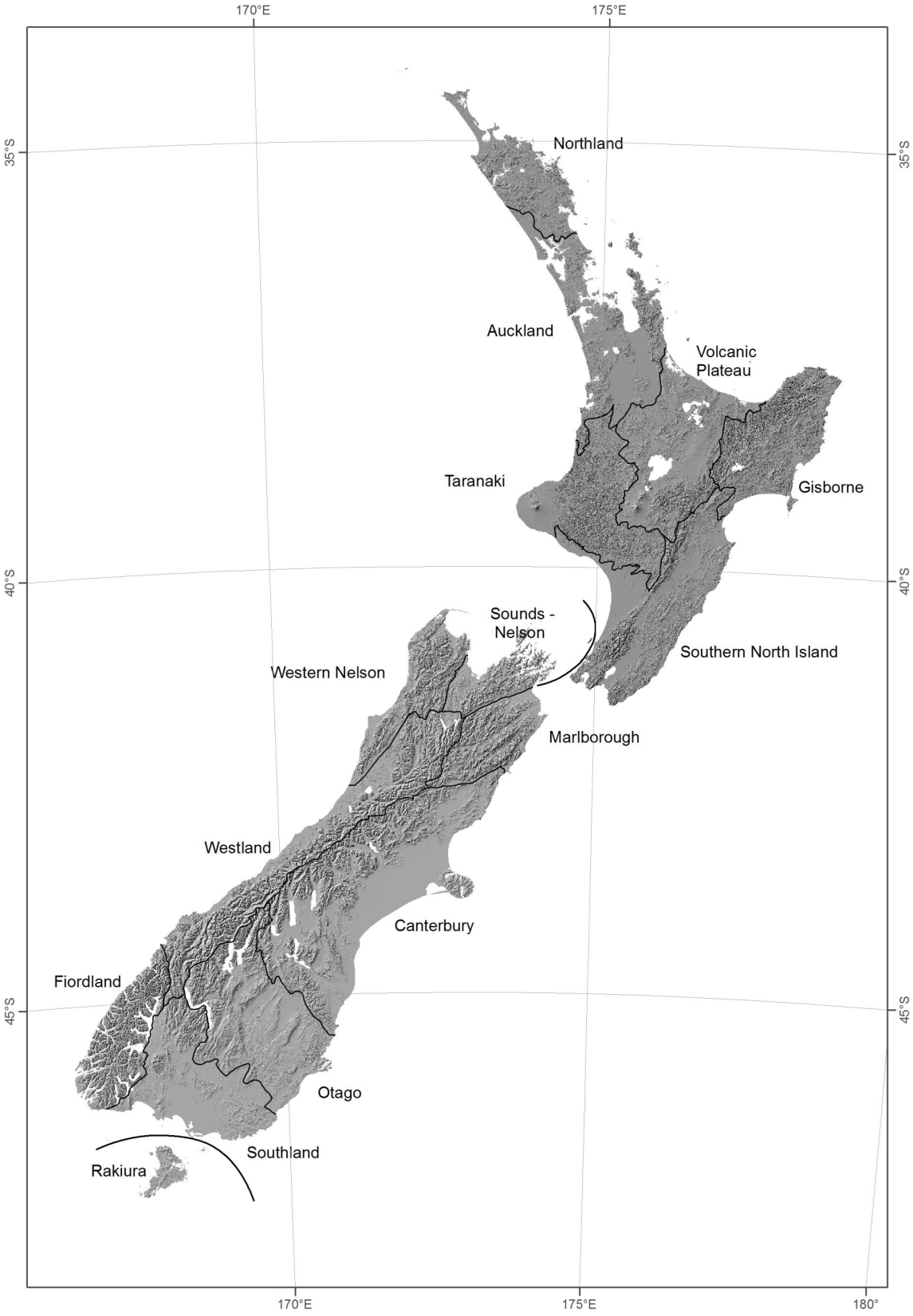


Map 1: Map of New Zealand and offshore islands showing Ecological Provinces



Map 2: Map of New Zealand showing Ecological Provinces

Index

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