



DISCOVERING FERNS

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www.facebook.com/nzferns

TE PAPA
OUR PLACE





- **Ferns in NZ (including culture)**
- **What is a fern?**
- **Recent research**
- **Conservation**
- **The identification of ferns**



Uses of New Zealand ferns

<http://www.cs.otago.ac.nz/research/foss>

- **Medicine** for skin complaints, scalds, mouth sores, and burns.
- **Scent.**
- **Ceremony.**
- **Raw materials.**
- **Weapons.**
- **Food** – fronds, rhizomes (underground stems), and pith from tree fern trunks.



Loxosoma cunninghamii



Asplenium bulbiferum



Lygodium articulatum



Fernleaf™

SILVER FERN FARMS

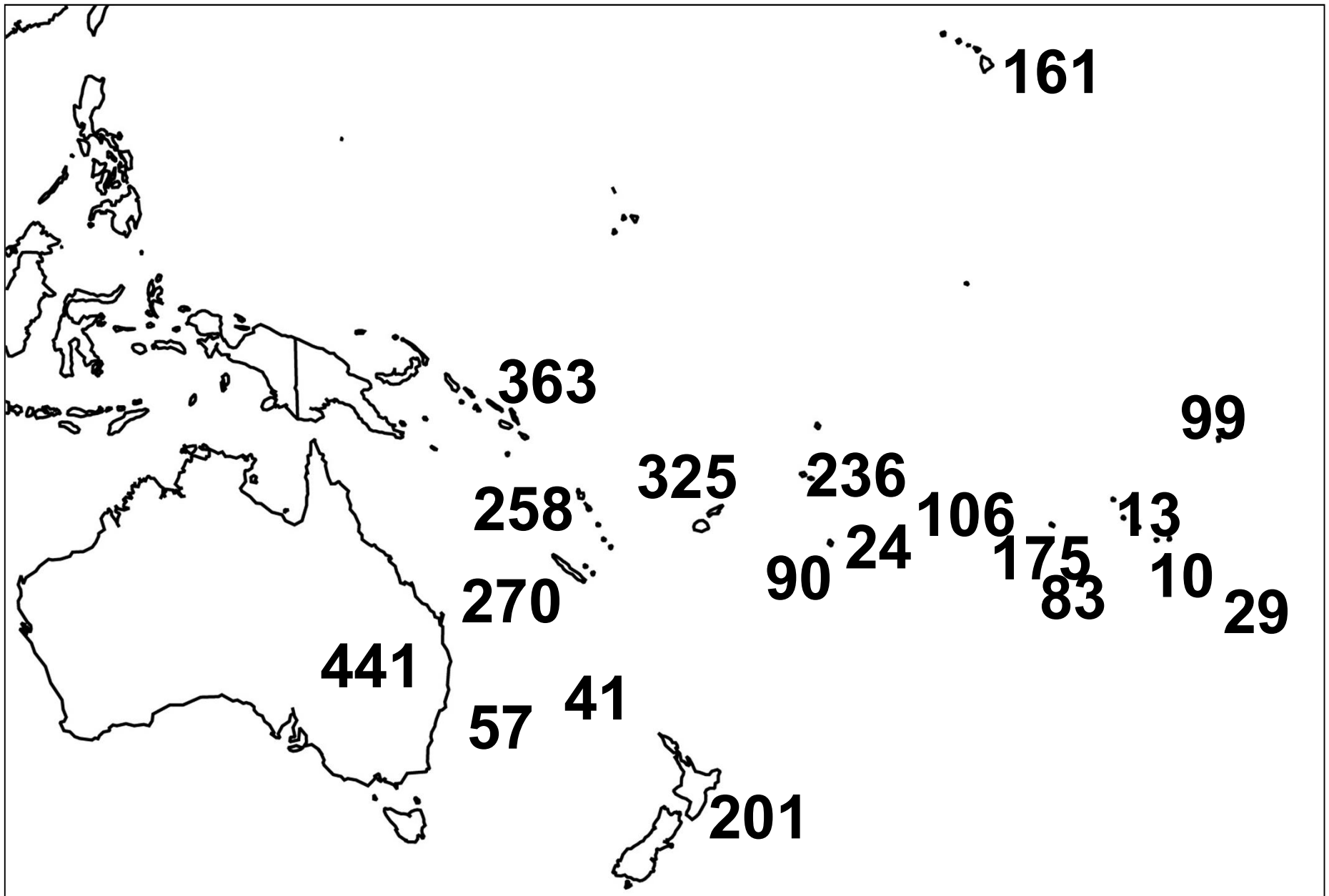
SILVER FERN HONEY

SILVER FERN rentals
silver fern shipping limited

qualmark
endorsed
visitor activity



New Zealand has relatively few fern and lycophyte species.







What is a fern? Their place amongst land plants



Bryophytes



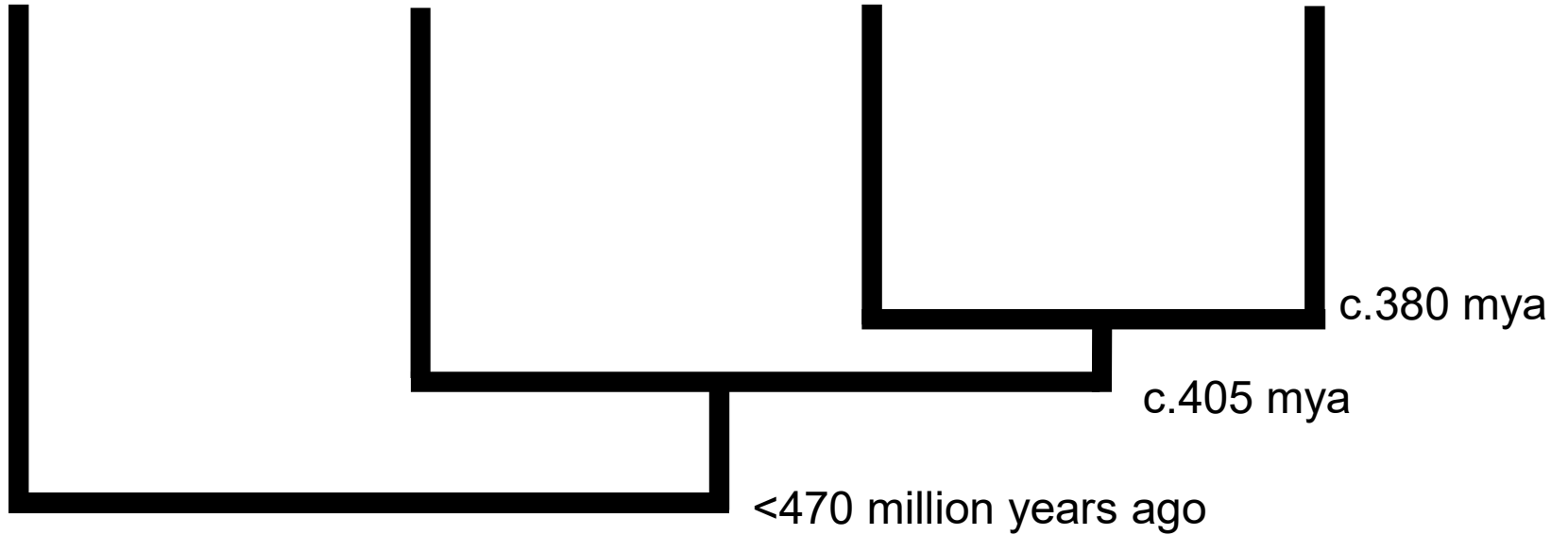
Lycophytes



Seed plants



Ferns



What is a fern? Their place among land plants

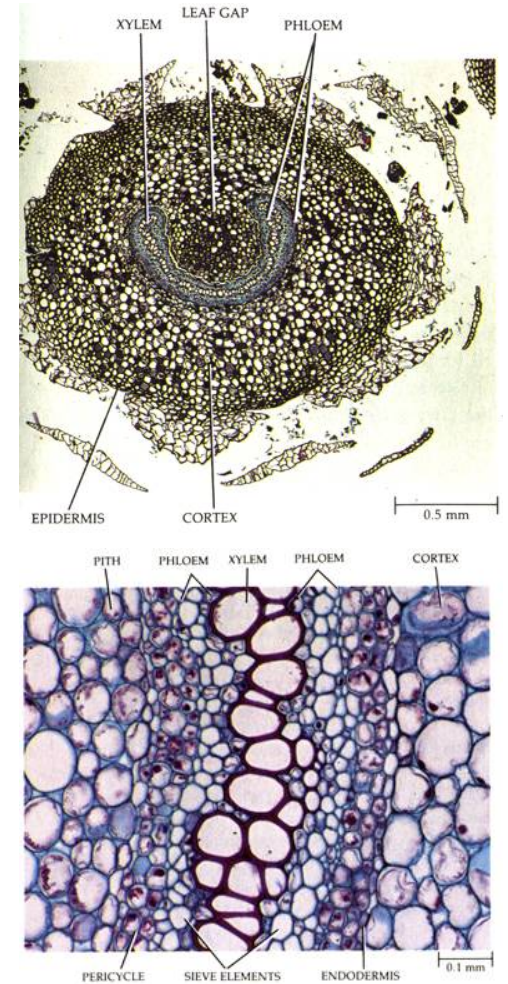
	Have vascular tissue?	Leaves megaphylls or microphylls?	Have seeds?
Bryophytes (mosses & liverworts)	no	microphylls	no
Lycophytes	yes	microphylls	no
Ferns	yes	megaphylls	no
Seed plants	yes	megaphylls	yes

What is a fern?

Ferns are vascular plants, with specialised water-conducting tissue.

Seed plants and lycophytes are also vascular plants.

Bryophytes (mosses and liverworts) are not vascular plants.



What is a fern?

Ferns have megaphylls
("big leaves", with many veins)
as do seed plants.



Lycophytes have microphylls
("small leaves", each with one vein).



What is a fern?

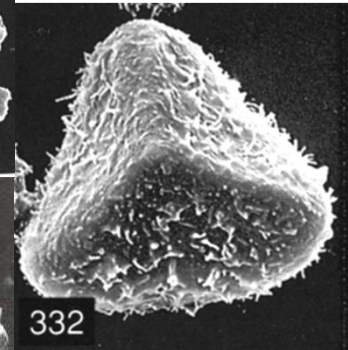
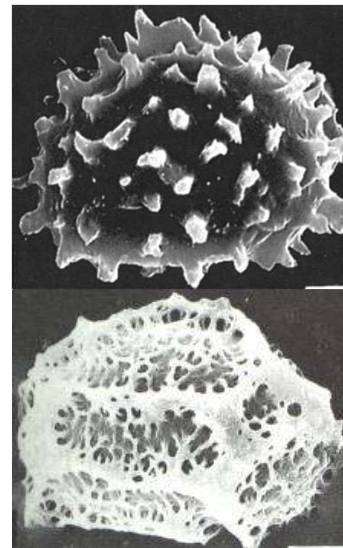
Ferns do not have seeds.

Ferns have no flowers or 'pine' cones.

Ferns disperse by spores

- single cells
- 20 – 100 μm
- wind dispersed
- produced in vast numbers

Bryophytes and lycophytes also have spores



What is a fern?

Circinate vernation

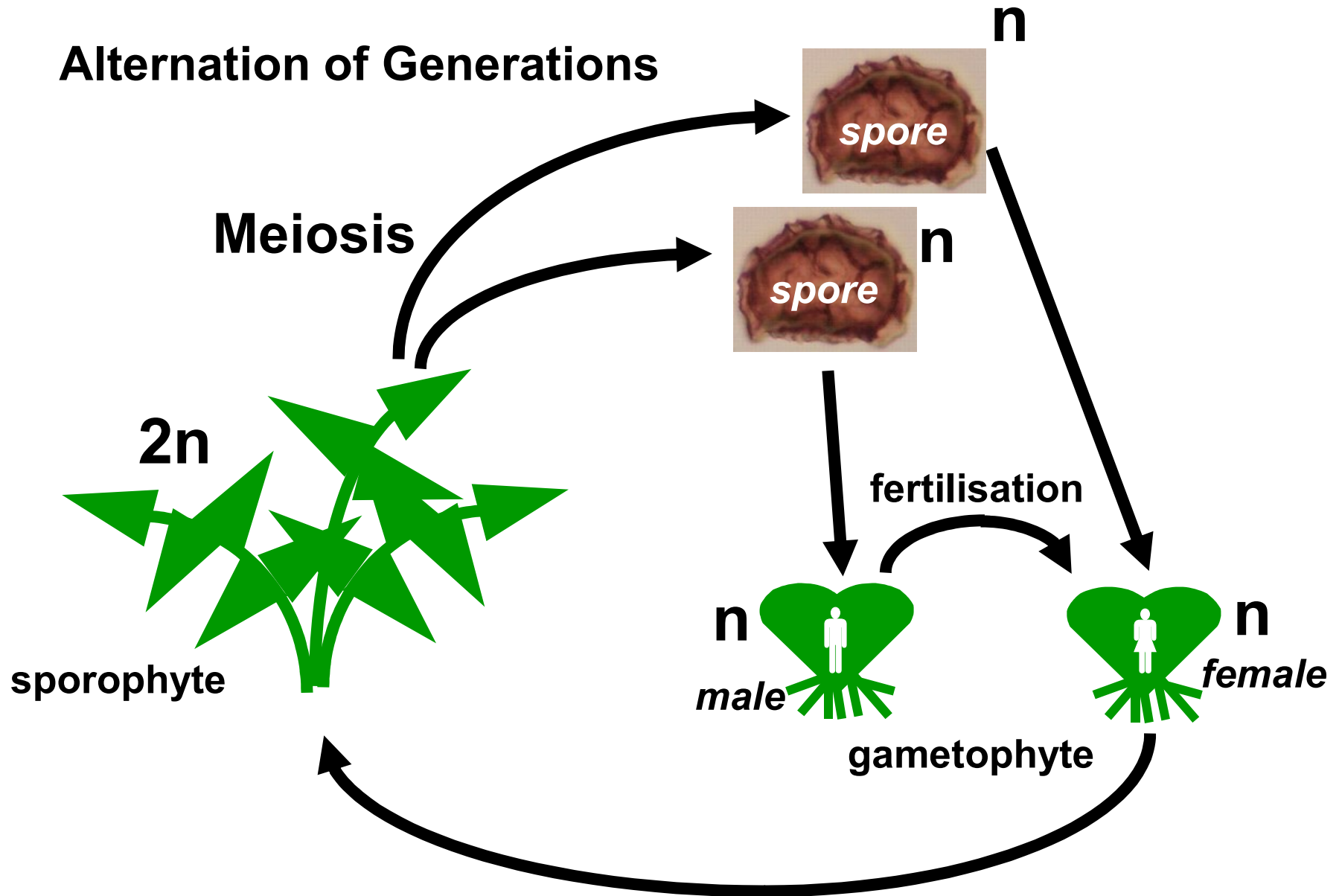
“koru”

“fiddlehead”



The fern life-cycle

Alternation of Generations





Research Discovery

There are still species to be found!

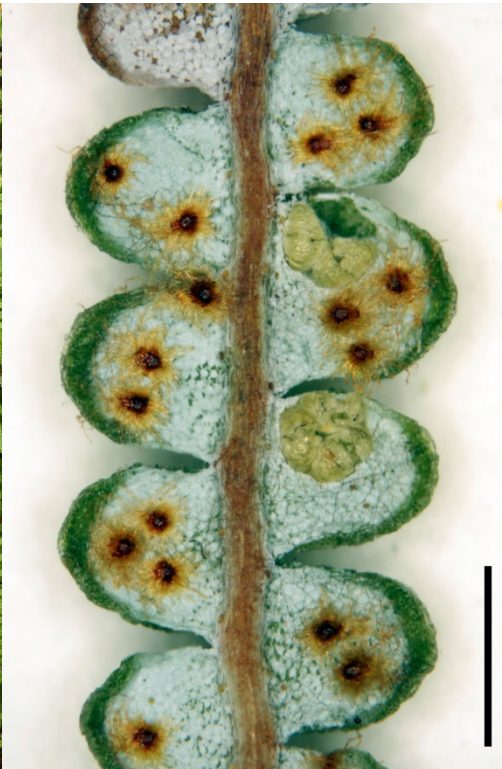
Gleichenia inclusisora, pitted tangle fern.



Research Discovery

There are still species to be found!

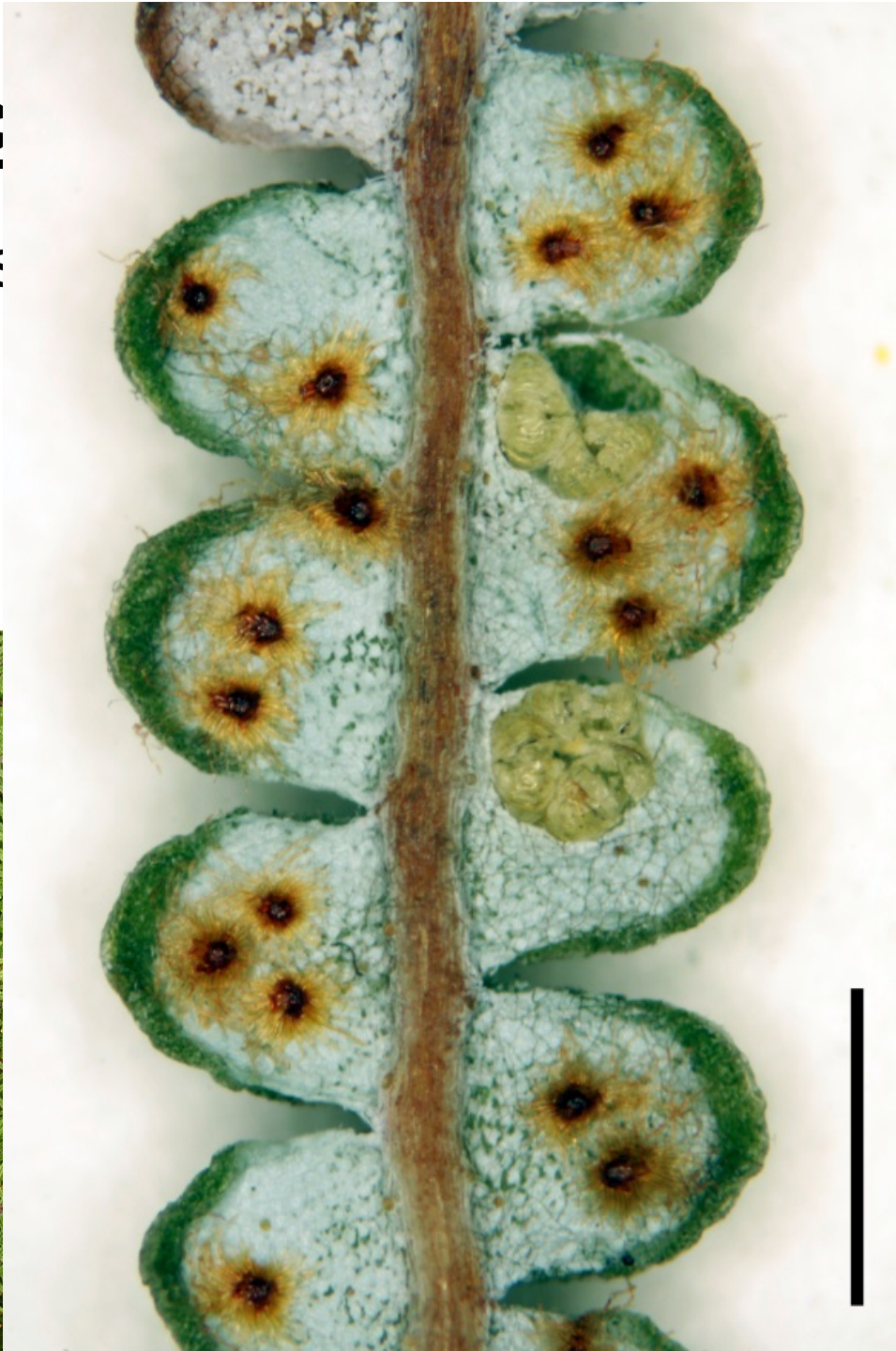
Gleichenia inclusisora, pitted tangle fern.



Research

There are s

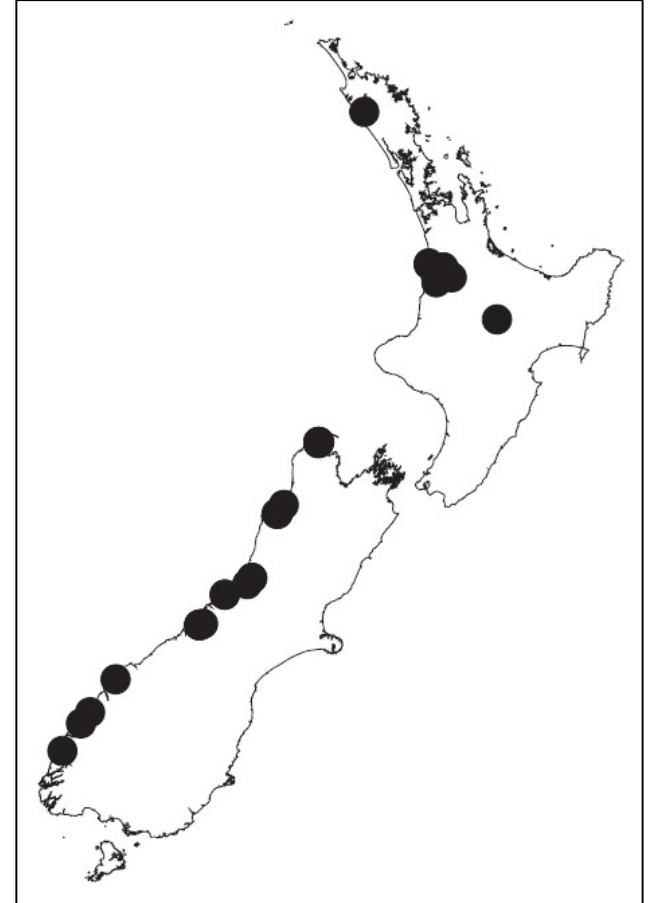
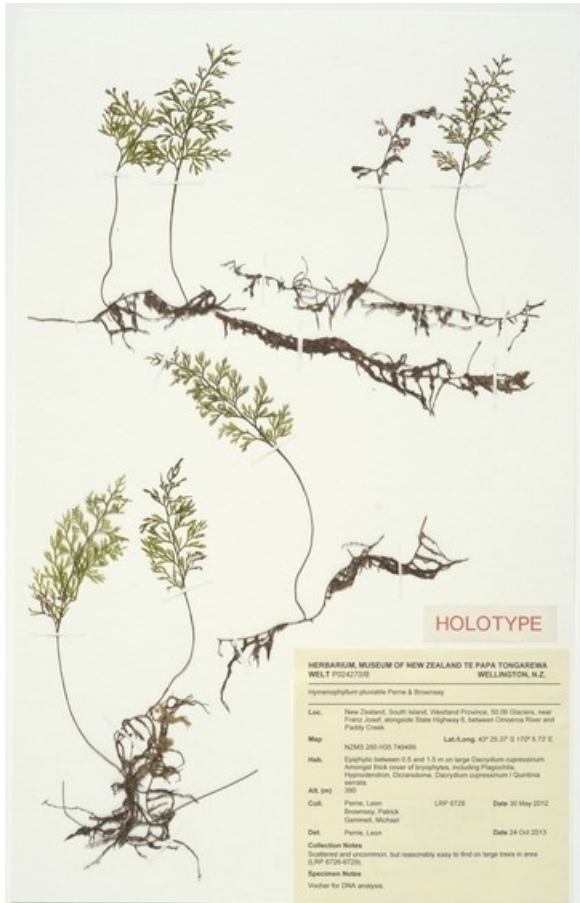
Gleichenia



Research Discovery

There are still species to be found.

Hymenophyllum pluviatile, rainforest filmy fern.



Research Discovery

There are still species to be found.

Asplenium lepidotum, north-west South Island.



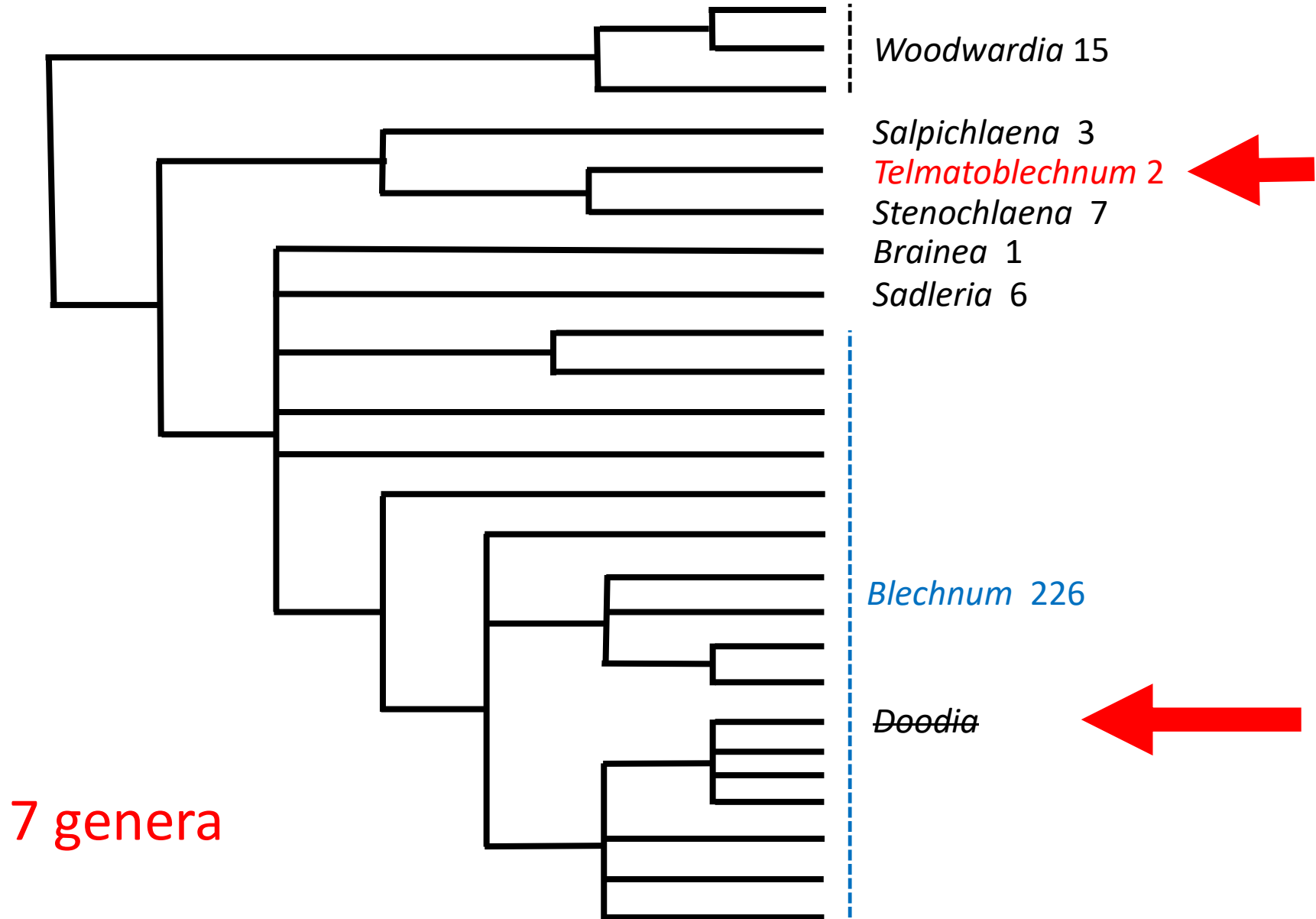
Research Changing names - *Blechnum*



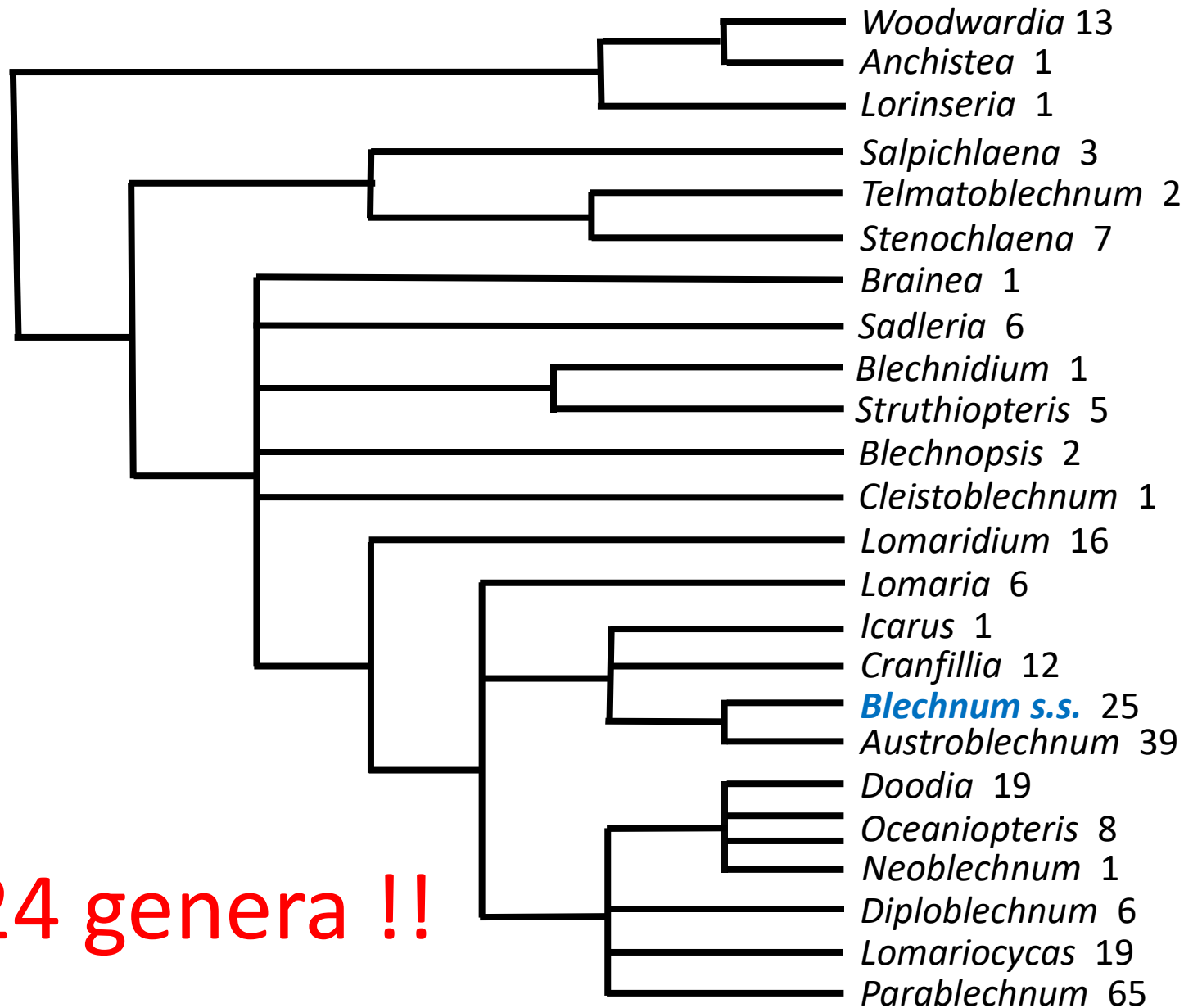
Research Changing names - *Blechnum*



Research Changing names - *Blechnum*



Research Changing names - *Blechnum*



24 genera !!

Research Changing names - *Blechnum*



Research Changing names - *Blechnum*



chambersii



nigrum



vulcanicum



fluviatile



discolor

Blechnum



blechnoides



filiforme



procerum



fraseri



penna-marina



colensoi



triangularifolium



Doodia

australis

Research Changing names - *Blechnum*



chambersii



nigrum



vulcanicum



fluviatile



discolor



blechnoides



filiforme



procerum



fraseri



penna-marina



colensoi



triangularifolium



australe

Blechnum

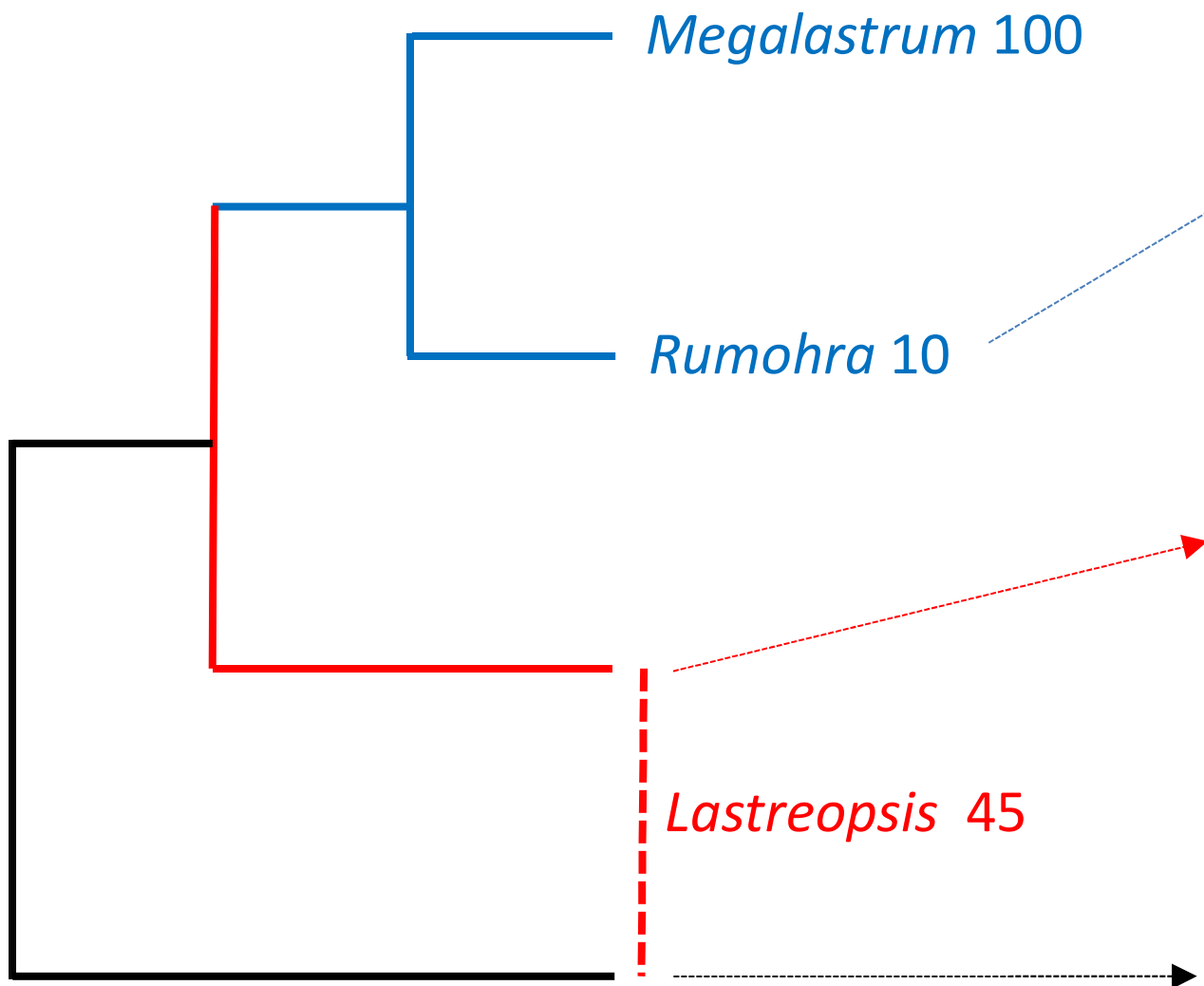
Research Changing names - *Blechnum*



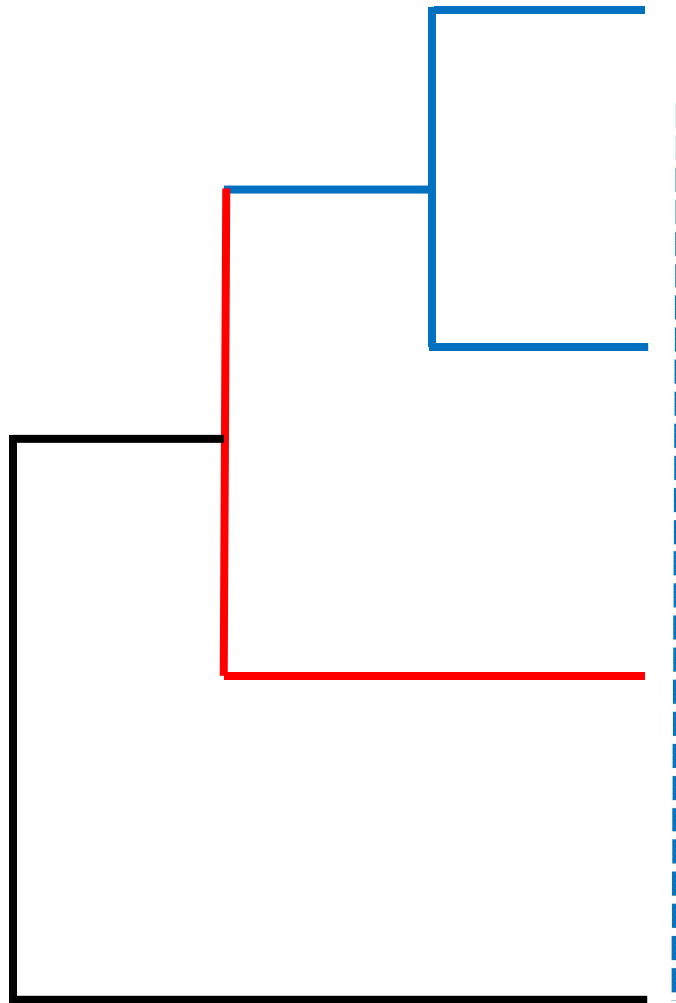
**Para-
blechnum**



Research Changing names - *Lastreopsis*



Research Changing names - *Lastreopsis*



Rumohra 145



hispida



velutina

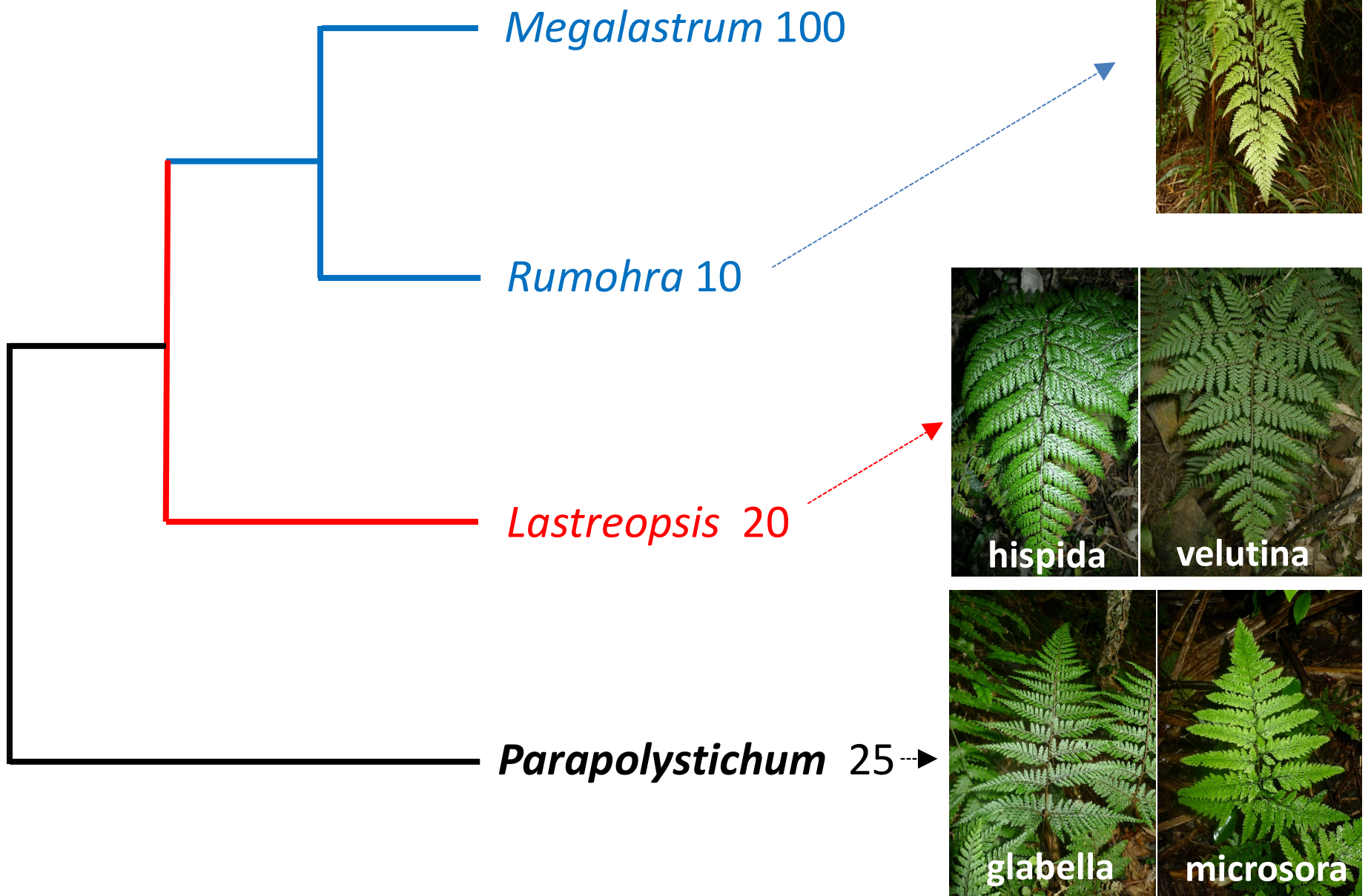


glabella



microsora

Research Changing names - *Lastreopsis*



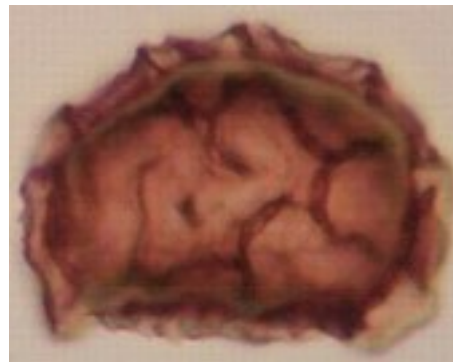
Research Biogeography

New Zealand's ferns are generally not 'old and isolated'.

About 110 species are shared with elsewhere, particularly south-eastern Australia.

My preferred explanation is that there is a lot of exchange.

Ferns regularly blow into New Zealand, *and* out of New Zealand.



Spore of a shield fern.
About 0.05 mm long.



Blechnum fluviatile
Also Australia & SE Asia



Rumohra adiantiformis
Also Australia & New Guinea

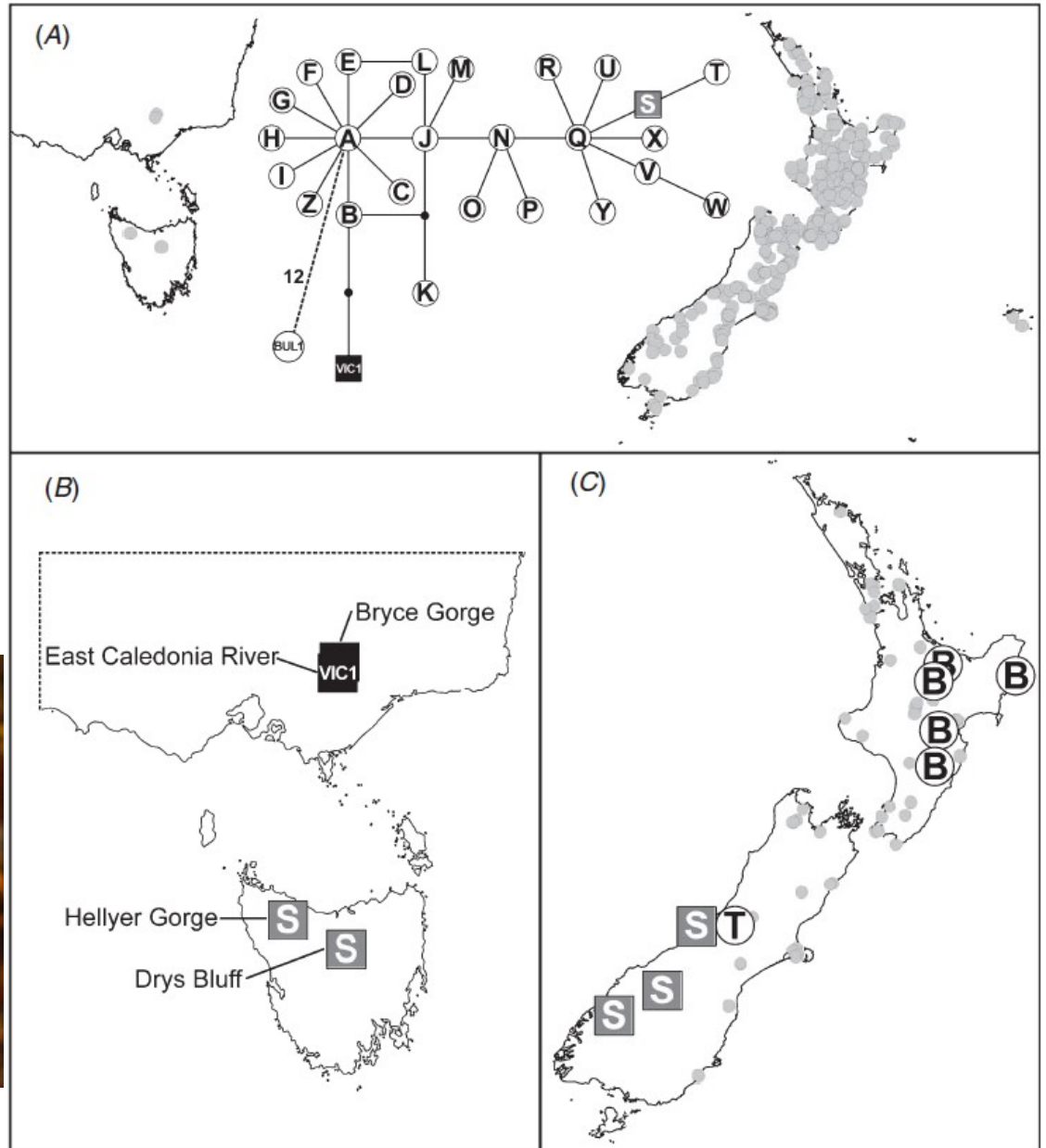


Microsorium pustulatum
Also Australia

Research Biogeography

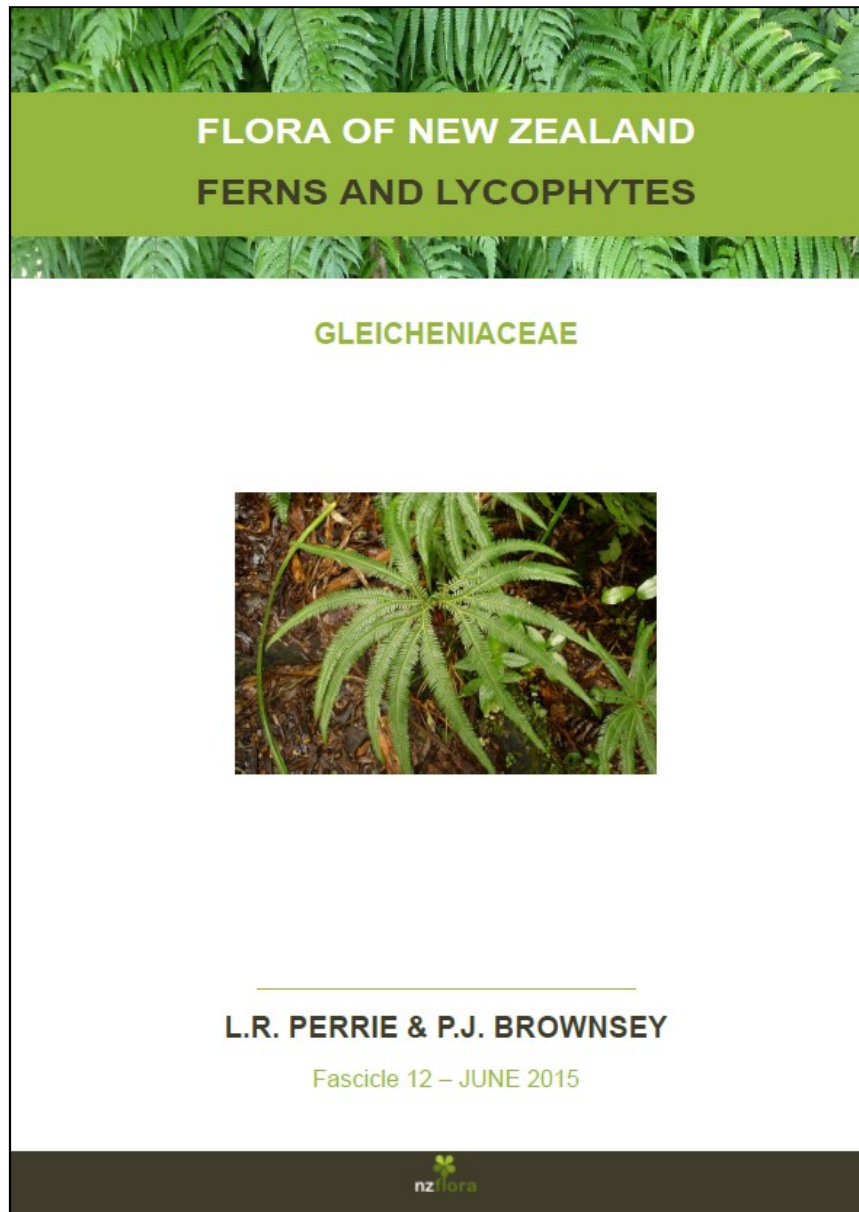
Asplenium hookerianum,
Hooker's spleenwort.

Has dispersed *from*
New Zealand twice
westward to Australia
and twice eastward to
the Chatham Islands.



Research eFloraNZ

www.nzflora.info



Done

Polypodiaceae (exc. <i>Notogrammitis</i>)	5
Lygodiaceae	6
Marattiaceae	7
Osmundaceae	10
Schizaeaceae	14
Equisetaceae	14
Loxsomataceae	15
Marsileaceae	16
Psilotaceae	22
Salviniaceae	23
Dicksoniaceae	26
Gleicheniaceae	35
Cyatheaceae	42
Ophioglossaceae	47
Hymenophyllaceae	78
Thelypteridaceae	83
Lindsaeaceae	86
Aspleniaceae	107
Dennstaedtiaceae	118
Tectariaceae	119

Cumulative total of indigenous species

In press/preparation

Athyriaceae & Cystopteridaceae

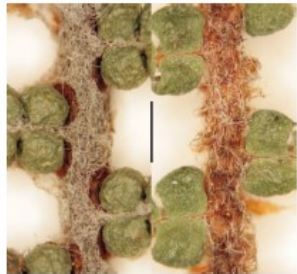


Fig. 26: Indumentum on the adaxial surface of the β costa. *Gleichenia alpina* (WELT P026744) at left; *G. dicarpa* (WELT P026797) at right. Scale bar = 1 mm.

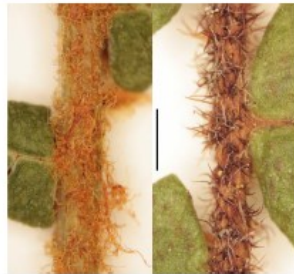


Fig. 27: Indumentum on the adaxial surface of the β costa. *Gleichenia inclusisora* (WELT P023651) at left; *G. microphylla* (WELT P026730) at right. Scale bar = 1 mm.



Fig. 28: Fronds of *Gleichenia microphylla* (left) and *G. dicarpa* (right).

Gleichenia alpina R.Br., *Prodr. Fl. Nov. Holland.*, 161 (1810)

- ≡ *Mertensia alpina* (R.Br.) Poir., *Encycl. Suppl.* 3, 670 (1814)
- ≡ *Platyzoma alpinum* (R.Br.) Desv., *Mém. Soc. Linn. Paris* 6: 199 (1827)
- ≡ *Calymella alpina* (R.Br.) C.Presl, *Tent. Pterid.*, 49 (1838)
- ≡ *Gleichenia dicarpa* var. *alpina* (R.Br.) Hook.f., *Bot. Antarct. Voy. II (Fl. Nov.-Zel.) Part II*, 5 (1854)
- ≡ *Gleichenia circinnata* var. *alpina* (R.Br.) Dobbie, *New Zealand Ferns ed. 4*, 44 (1951) — as *G. circinnata* var. *alpina*

Lectotype (designated by Perrie & Brownsey 2015): summit of Table Mountain [Mt Wellington], Derwent, [Tasmania], *R. Brown Iter Austral.* 105, BM 001038247!

= *Pteris platyzoma* Christenh. in Christenhusz et al., *Phytotaxa* 19: 22 (2011) nom. nov. pro *Gleichenia dicarpa* R.Br. 1810 (non *Pteris alpina* Field 1890)

Etymology: From the Latin *alpinus* (alpine), a reference to the habitat of this species.

Vernacular name: alpine tangle fern

Rhizomes long-creeping, 1–2.5 mm diameter; rhizome scales ovate or orbicular, 0.6–1.9 mm long, 0.4–1.1 mm wide, brown, shortly-setose. Fronds 85–1250 mm long. Stipes 60–860 mm long, distally scaly. Laminae 40–1100 mm long, 40–220 mm wide. Rachis buds usually extending 1–3 (rarely 0 or 4–9) times; rachis bud scales ovate, 1.0–2.7 mm long, 0.5–1 mm wide, brown, ciliate. Rachis buds without accessory leaflets. Pinnae 25–230 mm long, 15–120 mm wide; with 0–1 (rarely 2) pseudodichotomous forks (excluding growth from pinna buds); pinna buds (in pinnae with at least 1 fork) usually extending 1–5 (rarely 8) times. Proximal-most costae 4–22 mm long, scaly but

glabrescent in old fronds. γ costae (where not proximal-most costa) 5–17 mm long, with 0–2 pairs of costal leaflets. β costae 11–73 mm long, with 4–14 pairs of ultimate leaflets; adaxially with brown or pale branched-scales with curly branches that form a lanate mass; abaxially with dark-brown or orange-brown, ovate, ciliate scales, 680–1300 μ m long, 340–780 μ m wide, lacking stiffly stellate scales. Longest ultimate leaflets 8–41 mm long, with 11–48 pairs of ultimate segments. α costae adaxially with pale, branched hair-like scales percurrent; abaxially with ovate, dark-brown to orange-brown, ciliate scales, 340–960 μ m long, 250–520 μ m wide, percurrent. Ultimate segments 0.5–0.8 mm long, 0.6–1.0 mm wide, \pm square, abaxially pouched, apices rounded; adaxially green, \pm glabrous, strongly convex; abaxially \pm obscured by scales of a costa, but white, with small branched pale scales or \pm glabrous. Sori superficial but obscured by the strongly pouched ultimate segments and scales of a costa, each with 2 sporangia. Spores 36.4–45.4 μ m long, 41.7–50.0 μ m wide (6 populations).

Distribution: North Island: Volcanic Plateau, Gisborne, Taranaki, Southern North Island.

South Island: Western Nelson, Westland, Canterbury, Otago, Fiordland, Southland.

Stewart Island.

Altitudinal range: 0–1380 m.

Gleichenia alpina occurs from the central North Island through to the South Island and Stewart Island. It grows between 680 and 1380 m above sea level in the North Island, descending to 570 m in the northern South Island and reaching near sea level in southern Westland and further south. It is absent from east of the axial ranges in the South Island except for occasional populations in Otago. It has not been recorded from Mount Taranaki.

Also Australia (Tasmania).

Biostatus: Indigenous (Non-endemic).

Habitat: *Gleichenia alpina* occurs in subalpine bogs and scrub, and other cold, open habitats. It usually grows in the open, often growing through other vegetation, and rarely extends into forest. It favours wet ground, and is often found with *Empodisma*.

Recognition: *Gleichenia alpina* is characterised by comparatively short front axes and the dense orange-brown (becoming pale) scales that obscure the abaxial surface of the lamina. Its strongly pouched ultimate segments mean it can be confused only with *G. dicarpa*. From that species, *G. alpina* can be distinguished by: the absence of stellate scales with patent branches on the β costae; the strongly convex adaxial surface of the ultimate segments; only 0–1 (rarely 2) pseudodichotomous forks in the pinnae (excluding growth from pinna buds); the absence of accessory leaflets around the rachis bud; and pinna buds that usually extend, often more than once. In contrast, *G. dicarpa* has: stellate scales with patent branches (curled in Chatham Islands' plants) on the abaxial and/or adaxial surfaces of the β costae; complanate or weakly convex adaxial surface of the ultimate segments; 1–4 (rarely 0 or 5) pseudodichotomous forks in the pinnae (excluding growth from pinna buds); usually accessory leaflets around the rachis bud; and pinna buds that extend only occasionally and rarely more than once.

Cytology: No count has been made from New Zealand material of *Gleichenia alpina*, but $n = 20$ has been reported for Australian material (Tindale & Roy 2002).

Hybridisation: Infrequent morphological intermediates between *Gleichenia alpina* and *G. dicarpa* suggest this pair may hybridise (e.g., near Blackball, L.R. Perrie 6376 & L.D. Shepherd, WELT P026765; near Jackson Bay, L.R. Perrie 6756 et al., WELT P026768).

A single collection (Denniston, *F. Overmars* A17, WELT P026702, P026703) indicates that *Gleichenia alpina* hybridises rarely with *G. inclusisora*. Although there are few sori, they are embedded, and there are obvious scales on the abaxial surface of the ultimate segments, reflecting the involvement of *G. inclusisora*. However, these scales are larger, more ovate, and less-distinctly bicolorous than *G. inclusisora*, and the ultimate segments are abaxially more pouched, indicating the involvement of *G. alpina* or *G. dicarpa*. The large size of the scales suggests the other parent is more likely *G. alpina* than *G. dicarpa*; this is borne out by the hybrid's chloroplast DNA sequence, which matches *G. alpina* (L.D. Shepherd unpub.).

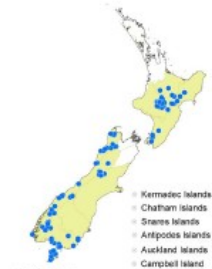


Fig. 29: *Gleichenia alpina* distribution map based on databased records at AK, CHR and WELT, and supplemented with selected OTA records.

Conservation Threat rankings

Threat classification rankings for (evaluated) native residents:

Extinct

Threatened Nationally Critical
 Nationally Endangered
 Nationally Vulnerable

At Risk Declining
 Recovering
 Relict
 Naturally Uncommon

Not Threatened (or At Risk)

Conservation Threat rankings

Threat classification rankings for (evaluated) native residents:

Extinct

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Declining
Recovering
Relict
Naturally Uncommon

Not Threatened (or At Risk)

Conservation Threatened ferns & lycophytes

*Phylloglossum
drummondii*

*Lycopodiella
serpentina*

*Tmesipteris
horomaka*

Todea barbara

Sticherus tener



Sticherus urceolatus

Anogramma leptophylla

Davallia tasmanii
subsp. *cristata*

Asplenium trichomanes
subsp. *quadrivalens*

Also *Botrychium lunaria*, *Ophioglossum petiolatum*, *Asplenium pauperequitum*

Conservation Numbers

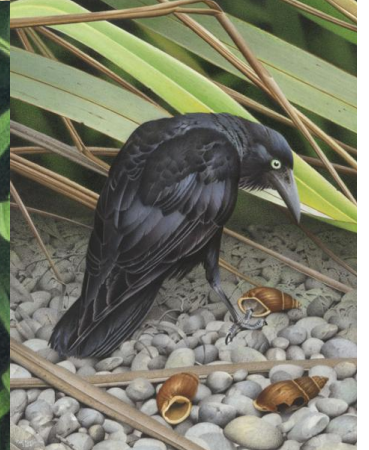
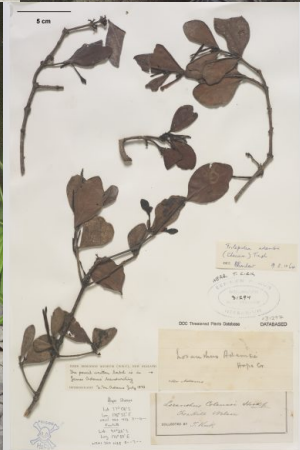
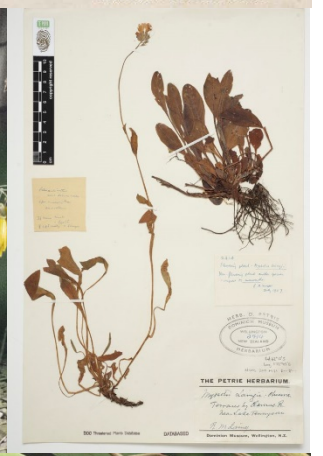
Extinct ??? species

Threatened ??? species

<http://blog.tepapa.govt.nz/2017/09/19/election-2017-voting-for-the-environment/>

Conservation Numbers

Extinct c. 80 species



Conservation Numbers

Extinct c. 80 species

Threatened ??? species

Conservation Numbers

Extinct c. 80 species

Threatened c. 800 species

Conservation Numbers

Extinct c. 80 species

Threatened c. 800 species

True number of Threatened actually much higher:

- Only about one quarter of New Zealand's 50 000 indigenous species have been assessed.
- Of the species that have been assessed, about one quarter are classified Data Deficient.

Conservation Numbers

Are we fixing it?

Birds: 2012 assessment has 77 Threatened.
By 2016 assessment, 14 species had improved out of Threatened (7 because of conservation management). But 3 other deteriorated to become Threatened.



North Island brown kiwi, Colin Miskelly



yellowhead, Ben Weatherley CC-BY-NC



northern NZ dotterel,
Emily Roberts CC-BY-NC-SA



North Island kaka,
Eric Cleveland CC-BY-C

Threatened to At Risk

At Risk to Threatened



Antipodes Island snipe, Colin Miskelly



Hutton's shearwater

5 cm

Conservation Numbers

Are we fixing it?

Birds: 2012 assessment has 77 Threatened.
By 2016 assessment, 14 species had improved out of Threatened (7 because of conservation management).
But 3 other deteriorated to become Threatened.

Everything else (with recent revisions): 450 Threatened.
73 deteriorated to become Threatened.
24 improved out of Threatened (none attributed to conservation management).

Conservation Broader context

About **two-thirds** of New Zealanders surveyed believed the condition of our native plants and animals to be **adequate** or **good** – Public Perceptions of New Zealand’s Environment (2016).

A ‘surprise’ because “**the state of New Zealand’s biodiversity can be regarded as bad or very bad**”.

“This public lack of understanding of the seriousness of the problem could ultimately hinder acceptance of additional expenditures and programmes in this area.”

Conservation Denniston

Mine site home to 8 Threatened species



Conservation Denniston

Mine site home to 8 Threatened species

Isolembidium anomalum var. *anomalum*

Neogrollea notabilis

Saccogynidium decurvum

Telaranea inaequalis

Austropeltum glareosum

Pycnothelia caliginosa

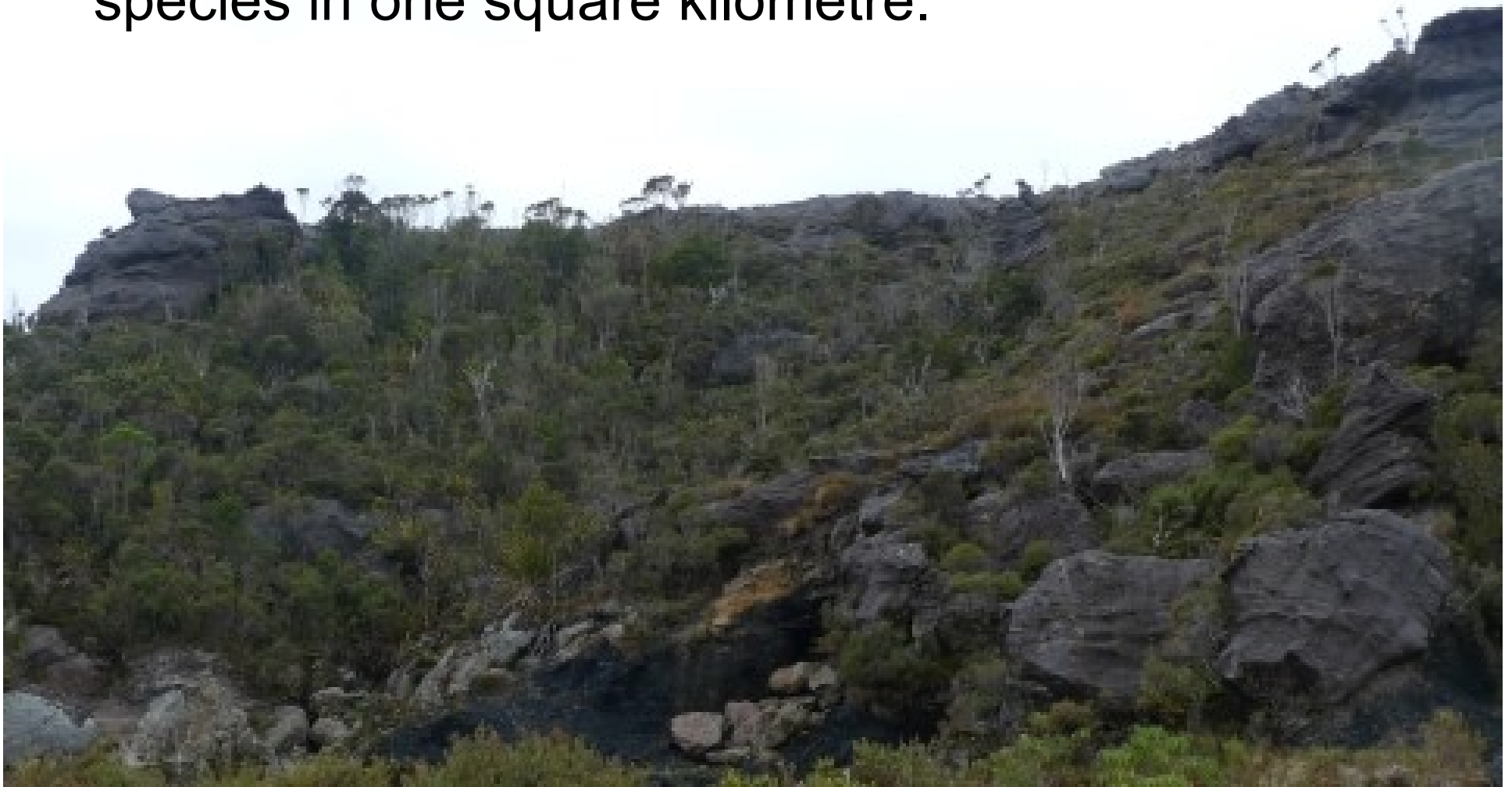
Sticherus tener

Powelliphanta patrickensis



Conservation Denniston

Exceptional to have so many Threatened species in one square kilometre.



Conservation Denniston

Exceptional to have so many Threatened species in one square kilometre.

How could this destruction be approved ?!?!

(Why was this area not already protected?)

Restoring Threatened species – after or before?



Conservation What can we do?

- Spread awareness of the need for action.

(But avoid complete gloom.)
- Positive actions (e.g., trapping, planting).
- Support conservation agencies.
- Get to know your flora and fauna, and help document it.

Practical identification of ferns

Four characteristics to focus on:

1. What is the shape and position of the reproductive structures?
2. Is the fern hairy, scaly, or glabrous (naked)?
3. How divided are the fronds?
4. Are the fronds tufted, or they spread out?

1. Reproductive structures

Shape & position.



2. Hairy, scaly, or glabrous?

Scaly tree fern



Hairy tree fern



2. Hairy, scaly, or glabrous?



3. How divided are the fronds?

Simple
(undivided)

Once
divided

Twice
divided

Thrice
divided

etc.



4. Are the fronds tufted, or spread out?

The rhizome (stem, often underground) can be short, or it can be creeping, with the fronds spread along it.



Observations



Species

Location

Go

Filters ²

New Zealand

362,760
OBSERVATIONS

13,219
SPECIES

2,878
IDENTIFIERS

6,880
OBSERVERS

Map

Grid

List



Fungi Including Lichens
(Kingdom Fungi)

7h



White Basket Fungus
(*leodictyon cibarium*)

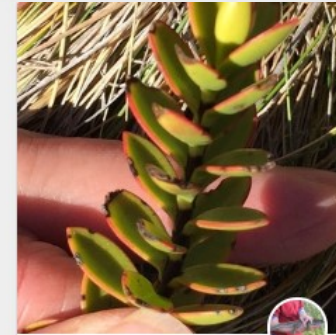
Research Grade 2

16d



Large Mountain Daisy
(*Celmisia semicordata*)

7d



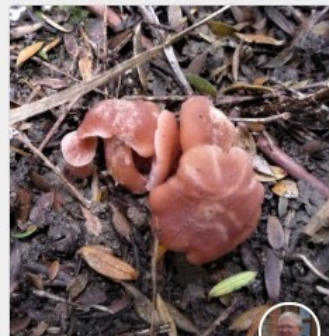
Veronica decumbens

7d



Olearia nummulariifolia

7d



Gilled Mushrooms
(Order Agaricales)

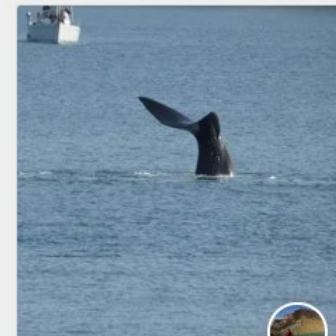
1d



Kina
(*Evechinus chloroticus*)

Research Grade 3

1d



Southern Right Whale
(*Eubalaena australis*)

Research Grade 2

2d

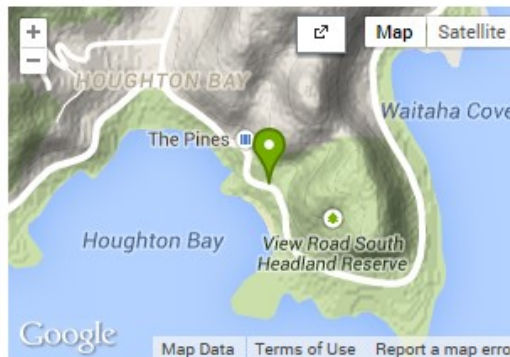
« Back to suniat's observations

« Previous Next »

Polystichum, observed by suniat on September 2, 2014



Photo © suniat some rights reserved



Location: *The Esplanade, Princess Bay, South Coast, Wellington* (Google, OSM)
 Places: *Wellington City* [More...](#)
 Lat: -41.3435517252, Lon: 174.7880293196
 Geoprivacy: open

Stage: *Adult*
 Cultivated: *No*
 Number of individuals: *1*

Description

More individuals scattered elsewhere around escarpment.

Added: Sep. 24, 2014 09:14 PM NZST

Comments & Identifications



suniat's ID: *Shield Fern* (Genus *Polystichum*) [Agree?](#)

Posted by suniat 28 days ago



Your ID: *Polystichum oculatum* [Remove](#)

Because the primary branches are the same colour (rather than darker) as the rest of the leafy bit of the frond.

Identification Summary



suniat's ID: *Shield Fern* (Genus *Polystichum*) [Agree?](#)



Your ID: *Polystichum oculatum* [Remove](#)

suniat would like some help identifying this.

Identotron

Projects

► [Invite to project](#)



[View 3 from September 2, 2014](#) »

Data Quality Assessment

Quality grade: **research** [details](#)

Observation © suniat

some rights reserved

Is this observation inappropriate, spam, or offensive? [Flag this observation](#)

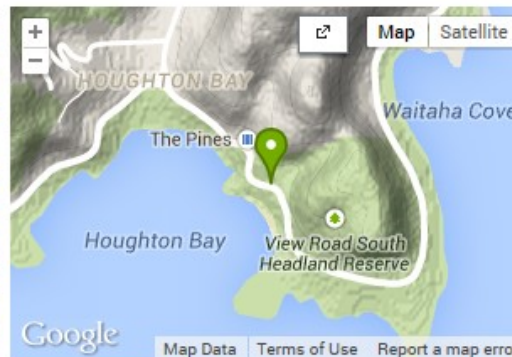
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Polystichum, observed by suniat on September 2, 2014



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Location: *The Esplanade, Princess Bay, South Coast, Wellington* (Google, OSM)

Places: *Wellington City* [More...](#)

Lat: -41.3435517252, Lon: 174.7880293196

Geoprivacy: open

Stage: Adult

Cultivated: No

Number of individuals: 1

Description

More individuals scattered elsewhere around escarpment.

Added: Sep. 24, 2014 09:14 PM NZST

Identification Summary



suniat's ID: *Shield Fern* (Genus *Polystichum*) [Agree?](#)



Your ID: *Polystichum oculatum* [Remove](#)

suniat would like some help identifying this.

Identotron

Projects

► [Invite to project](#)



[View 3 from September 2, 2014](#) »



Your ID: *Polystichum oculatum* [Remove](#)

Because the primary branches are the same colour (rather than darker) as the rest of the leafy bit of the frond.

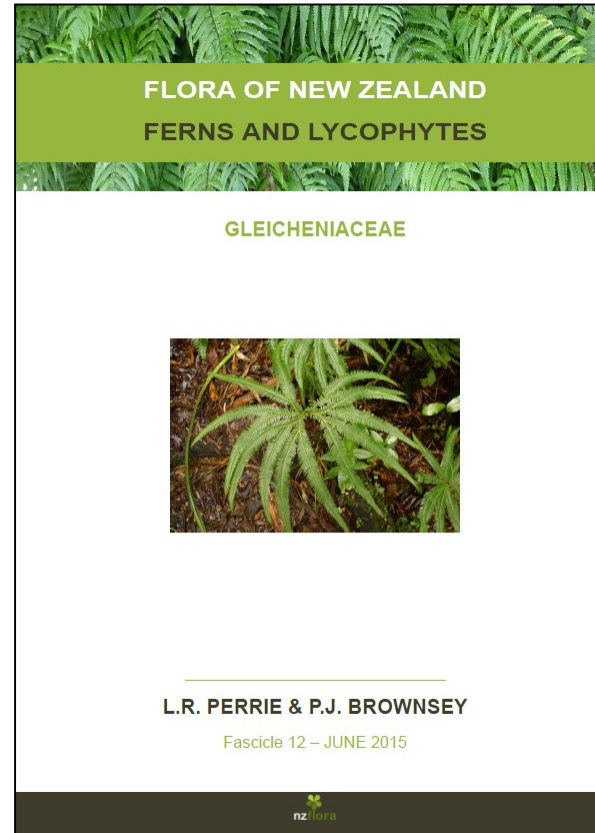
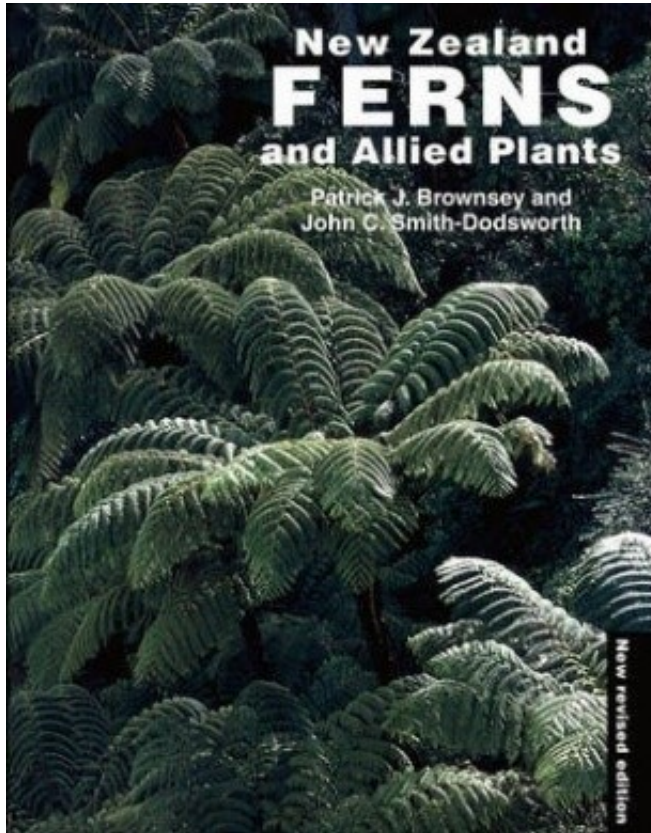
offensive? [Flag this observation](#)

Identification Artificial intelligence test



Other Fern Resources

www.nzflora.info



Online Guides

Common NZ ferns: <http://collections.tepapa.govt.nz/topic/3584>

New Zealand tree ferns: <http://collections.tepapa.govt.nz/topic/2024>

Te Papa's *Secret World of Ferns* video: <http://www.youtube.com/watch?v=q3wDaE0mNTU>

Facebook groups

New Zealand Ferns, Wild plants of Wellington



Acknowledgements

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