IDENTIFYING FILMY FERNS

EDITH SHAW & JIM CRAWFORD

New Zealand has a very rich flora of filmy ferns in the genera *Hymenophyllum* and *Trichomanes*. Because filmy fern fronds are often only one cell thick they are very sensitive to sun and wind and although they can tolerate dry conditions by curling up they grow best in humid forests. Many are small. They can be epiphytic, terrestrial or rupestral and nearly all have long creeping rhizomes.

People seem to be able to sort out larger ferns relatively easily, but when filmies appear there seem to be more problems. Why should these delicate ferns be avoided? In the standard fern references the keys to filmy ferns tend to go through long and complicated steps. To a beginner this can be very off-putting. From sheer frustration Jim devised his own key which he has shared around, encouraging others to take up the challenge and learn to distinguish filmy ferns. Here we share with the world at large our experience in using this key.

A hand lens or magnifying glass of ten magnification is essential and a reference book such as Brownsey & Smith-Dodsworth (1989) is necessary. For identification purposes do try and find a specimen with sori. For beginners there is a trap we all stumble into. Young plants of *Leptopteris* spp. are easily mistaken for species of filmy ferns, but they have quite different sori (see Brownsey & Smith-Dodsworth (1989) for the distinctive features). (See the glossary at the end of the article for explanations of the technical terms.)

From now on a step-wise sequential approach to keying out filmy ferns is followed:

First Step Look at the fruiting bodies and decide to which genus the specimen belongs. The species with two-flapped indusia are *Hymenophyllum*. Plants with tubular indusia having a protruding hair-like structure are *Trichomanes*.

Referring to the *Hymenophyllum* key

Second Step Look at the margin of the frond. Has the specimen got a smooth edge or a toothed margin?

Third Step Look for the presence or absence of hairs on the frond.

Fourth Step Is the stipe winged or wingless? If the specimen is winged it will have a thin portion of lamina bordering the stem and/or mid-rib.

Referring to the *Trichomanes* key

Fifth Step Is the root system tufted or rhizomatous?

When you think you have identified your specimen, refer to a book such as Brownsey & Smith-Dodsworth (1989) for confirmation.

HYMENOPHYLLUM

Toothed Lamina Margins

1. Very small (fronds <5 cm long)

H. armstrongii	Dark green, tiny simple or forked fronds with black mid-ribs and spiny margins; Smooth indusium flaps. Found forming mats on rocks or intertwined with mosses on trees, mainly high altitude, or coastal areas with high rainfall
lyallii	Fan-shaped frond with minute branched hairs on stipes and lamina margins. All segments of lamina forking and radiating from the stipe. Located mainly in the west of both main islands. Epiphytic on tree fern trunks or at the base of other trunks.
minimum	Indusium flaps toothed, with spines on back. Forms mats on wet rock faces, in high rainfall areas.

2. Medium (fronds usually 5 - 10 cm long)

cupressiforme	Like *H. revolutum* but winged throughout. Indusium slightly toothed. Prefers light shade in lowland to montane forests.
peltatum	Winged rachis; smooth indusium flaps. Grows on rocks in damp forest.
revolutum	Lamina partly winged; indusium flaps deeply toothed. Common in lowland to montane forest. Has various habitats - either on the ground, on rocks, fallen logs or as an epiphyte.

3. Large (fronds usually > 10 cm)

bivalve	Sori in the main plane of the lamina. Usually on the ground at lower altitudes.
multifidum	Sori at 90° to plane of frond. Common in sub-alpine scrub.

Smooth-Edged Lamina With Hairy Surface, Wingless Stipe

ferrugineum	Rust brown stellate hairs on both lamina surfaces. Usually epiphytic in forest in very wet climates.
malingii	Blue and grey hairs on upper lamina surface. Usually found in mountain districts on *Libocedrus bidwillii* trunks; less common on kamahi, archeria, rata, kahikatea, beech, on the ground or on rocks.
rufescens	Silky red-brown hairs on rhizomes, stipes and rachis. Frond is triangular in shape and stipe is longer than lamina. Pinnae may overlap like *H. flabellatum*. Epiphytic on old stumps or tree trunks in montane forest.
scabrum	Dark olive-green pinnae. Rough bristly hairs cover stipe, rachis and (sparsely) young lamina. Epiphytic on trees, logs or on rocks in damp forest.
villosum	Like *H. sanguinolentum* but has hairy stipe and usually a hairy lamina. Has smooth indusia. Tip of frond very narrow and pendulous with numerous sori. Found in montane or sub-alpine scrub, epiphytic on trees, shrubs, sometimes on ground.

Smooth-Edged Lamina Without Hair, Wingless Stipe

demissum	Most common filmy; narrow paired sori, lamina rarely curls.
flabellatum	Pinnae fan-shaped and overlapping. Tufts of unbranched golden-yellow hairs on stipes and rhizomes. Frequently epiphytic but also on overhanging rocks, logs and banks.
rarum	Upper part of rachis partly winged; stipe hair-like; lamina very thin, grey-green; common in lowland to montane forest.
scabrum	As in above section; lamina often glabrous.

villosum — As in above section; lamina sometimes glabrous.

Smooth-Edged Lamina, Winged or Partly Winged Stipe

atrovirens — Long narrow, blackish-green triangular frond. Partly winged. Wing is flat or slightly crinkled. Found in deep shade near waterfalls and streams.

dilatatum — Largest filmy. Broad flat wing along rachis and part of stipe. Very broad pinnae. Very common throughout forests.

flexuosum — Undulating and crinkled wing on stipe and rachis. Usually on rock in streams and gullies.

pulcherrimum — Second largest filmy with crinkled fronds. Only one with tufted root system. Epiphytic in damp forest.

sanguinolentum — Indusium flaps with distinct crests on back; many sori on short segments in upper part of frond; small black, often zigzag rachis. Drought-resistant, frequently curls into a tight ball in dry conditions.

NB: *H. pulcherrimum*, with a tufted root system is the only species in this genus without a long, creeping rhizome.

TRICHOMANES

1. Tufted root system:

elongatum — Dark olive green; conspicuous brown bristles emerging from indusia on undersurface of frond; found in damp, dark places, e.g. under overhanging banks along streams in coastal and lowland forests.

strictum — Single unbranched vein in each lamina segment. Rachis narrowly winged. Prefers west coast of both islands, and in high altitude forests. Found in damp shady places, often among tree roots, mossy stream sides or on clay banks.

2. Long creeping rhizome:

colensoi	Pinnae finely divided and widely spaced. Solitary indusium on a stalk. Prefers high rainfall areas away from direct light, under overhanging rocks.
endlicherianum	Similar to *T. colensoi* but frond winged and less divided; indusia sunken in lamina - not stalked. Found on wet rocks in deep shade, in coastal to montane forest.
reniforme	Lamina undivided - kidney fern. Forms extensive mats in lowland to montane forest on ground, logs, or epiphytic.
venosum	Translucent pale-green frond with prominent veins. Grows on tree ferns. Very common.

Trichomanes reniforme, the kidney fern, has a very distinctive frond. *T. elongatum* ultimate lamina sections are broad and have veins that fork several times. The other species are distinguished by the shape and position of their indusia. *Trichomanes venosum* and *T. endlicherianum* are very similar looking but *T. venosum* has very prominent branching veins whereas *T. endlicherianum* has only one single unbranched vein. *T. strictum* is also very similar but has a tufted rooting system instead of a rhizome.

GLOSSARY

bristly hairs	hairs with pointed ends.
frond	the complete leaf of a fern including stipe and lamina; has branching veins and usually bears sporangia on the margin or underside.
glabrous	devoid of hairs; smooth.
hair	an outgrowth from the plant surface consisting of a single row of cells; may be branched or unbranched.
indusium	a thin, often colourless outgrowth of tissue covering the sorus; shrivels or bends backwards at maturity to expose the sporangia (plural indusia).
lamina	the flattened blade or leafy part of the frond borne on the stipe.
margin	edge or border of a leaf.

midrib — the thickened central stem of a pinna that contains the main veins.

pinna — a segment of a divided lamina (plural pinnae).

rachis — the main stem of the lamina extending in a divided frond, from the junction of the lowermost pinnae to the apex.

rhizome — an underground stem; usually spreading horizontally, creeping, sometimes above the ground.

sessile — tapering at the base but lacking a distinct stalk.

sorus — a cluster of two or more sporangia on the margin or underside of the lamina, usually having a characteristic shape or form, and sometimes protected by an indusium (plural sori).

sporangium — a capsule containing spores (plural sporangia).

spore — a single-celled reproductive unit similar in function to a seed of a flowering plant.

stellate — irregularly branched or star-shaped.

stipe — the stalk of the frond.

wing — the thin portion of lamina bordering the stem or midrib.

REFERENCE

Brownsey, P.J., Smith-Dodsworth, J.C. 1989. *New Zealand Ferns and Allied Plants.* David Bateman, Auckland

Appendix 1

BOTANICAL NAMES AND BRIEF BIOGRAPHIES

Extracts from:

The Botanical Names of the Flora of New Zealand by Professor Arnold Wall and Dr H.H. Allan.
Trees & Shrubs of New Zealand Volume II by Audrey Eagle.

armstrongii	Named in honour of J.F. (1820-1900) or J.B. Armstrong (1850-1926). Father and son botanized extensively in Canterbury. J.F. was curator of Christchurch Botanic Gardens 1867-1889. T. Kirk described *H. armstrongii* in TNZI in 1878.
atrovirens	"Blackish green" Lat. ater, black, virere, to be green.
bivalve	Refers to two-valved indusium, but most species of the genus are two-valved.
colensoi	Named in honour of William Colenso (1811-1899). As well as being an early missionary he was a keen botanist who assisted J.D. Hooker and A. Cunningham.
cupressiforme	"Cypress-like".
demissum	"Hanging down" Lat. demissus. This species rarely curls.
dilatatum	"Broad leaved", Lat. dilatere to widen, dilate. In this species it refers to the breadth of the fern.
elongatum	"Long", lit. "elongated", Lat. adj. from e - and longare, to lengthen. In *T. elongatum* it refers to the long bristles emerging from the indusia on the under-surface of the frond.
endlicherianum	Named in honour of Stephan Ladislaus Endlicher (1804-1849), Austrian botanist who formulated one of the three major systems of plant classification. J. Presl of Czechoslovakia published information about this fern in 1849. It was discovered in Europe and is found as far south as latitude 44°, including Norfolk Island, Fiji, Samoa, Tahiti, Kermadec Islands and both islands of New Zealand.
ferrugineum	"Rust coloured" Lat. adj. from ferrugo, rust.
flabellatum	"Fan shaped" Lat. adj. from flabellum a fan.

flexuosum "Flexuous, wavy, undulating" Lat. flexuosus from flexus refers to the wing of this species.

Hymenophyllum "Membraneous leaf" Greek humen, membrane and phullon, leaf.

lyallii Named in honour of David Lyall (1817-1895). Member of the British Antarctic Expedition (1839-1843) as assistant surgeon and botanist on the "Terror"; 1847 joined "Acheron" on the voyage to complete Cook's hydrographic survey of New Zealand and Australia. Studied plants in Fiordland and was first to botanize on Stewart Island.

malingii Named in honour of Mr Maling, a surveyor who discovered this fern at Waimarino, Golden Bay. He was later killed in the Wairau massacre. J.D. Hooker first wrote about this fern in "*Garden Ferns*" 1862. This Mr Maling is the same person who assisted Travers, the explorer, and for whom Mt Maling and Maling Pass are named, near Lake Tennyson, Canterbury.

minimum "Smallest or very small" Lat. superlative of parvus, small.

multifidum "Much divided" Lat. multifidus (multus, many).

peltatum "Shield shaped, peltate" Lat. pelta, from Greek peltè, a light shield.

pulcherrimum "Beautiful" Lat. pulcher.

rarum "Thin" Lat. rarus.

reniforme "Kidney shaped" Lat. renes, the kidneys and -formis, shaped.

revolutum "Rolled back" Lat. ptcple of revolvere, to roll back.

rufescens "Reddish" Lat. ptcple from rufescere, to become red (rufus, red)

sanguinolentum "Smelling like blood" Lat. sanguis, blood; smell refers to the dried specimen.

scabrum "Rough" Lat. scaber

strictum "Erect and very straight" Lat. strictus. This species has a single unbranched vein in each lamina segment.

Trichomanes	"Fine hair", Greek, trikhos, gen. of thrix, hair and manos, thin, loose. Refers to the slender hair projecting from the indusia.
venosum	"Veined" Lat. adj. from vena, vein. This species has very prominent veins.
villosum	"Shaggy, hairy" Lat. adj. from villus, shaggy hair, tuft of hair.

HYMENOPHYLLUM MALINGII

EDITH SHAW

Hymenophyllum malingii is an uncommon fern confined in the North Island to mountain districts from Te Aroha to the Ruahines. In the South Island it is found in lowland to montane forests in Nelson, near the Main Divide in Canterbury, in Westland, Fiordland and near Dunedin.

Usually it is epiphytic on dead or living trunks of *Libocedrus bidwillii*. Recently other habitats have been brought to my attention. Eileen Heatherbell of the Nelson fern Society reported *Hymenophyllum malingii* growing on rocks at Lake Rotoroa - Nelson Lakes National Park. Along with a small group of friends during February 1994 I found it growing in the Matiri Forest - a mixed beech forest near Murchison. As well as being on the ground and on fallen logs it was on live tree trunks of *Libocedrus bidwillii, Weinmannia racemosa, Nothofagus solandri* and felled trunks of *Metrosideros umbellata*. Because of the diversity of habitats I thought Matiri Forest was outstanding for *H. malingii*.

In March of this year Les Moran, a member of a DoC possum eradication team, took me to a south-west spur running from Mt Lodestone down to Flora Saddle Creek. Here we crawled on our hands and knees into a grove of *Archeria traversii*. *Hymenophyllum malingii* in this *Archeria* grove covered an amazingly extensive area. Not only was it on the *Archeria* trunks and branches but it also grew just as profusely on the ground and in association with moss and lichens on rocks. In this latter habitat the fronds were very stunted.

At the edge of the *Archeria* grove as well as being on the ground *H. malingii* had draped itself around *Nothofagus solandri* trunks. The spur is warm and dry and there are no *Libocedrus bidwillii* trees in this location. Other *Hymenophyllum* species growing in this area were *H. flabellatum, H. multifidum*, and *H. villosum*.

Reference

Brownsey, P.J., Smith-Dodsworth, J.C. 1989. *New Zealand Ferns and Allied Plants*. David Bateman, Auckland