A preliminary list of liverworts from Hinewai

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This paper provides a list of 2 hornworts and 62 liverworts identified from Hinewai Reserve, Canterbury. The list was mainly compiled from collections made during a four day visit by Wellington Botanical Society members in January 2005. Additional species have been included from earlier records and from specimens held in herbaria at CHR and WELT.

This paper first describes aspects of Hinewai that are relevant to liverworts and the habitats identified within the reserve. This is followed by a few notes on the species found. The last page provides the list of liverworts so far recorded at Hinewai.[2]

HINEWAI RESERVE

Hinewai is a 1,050-hectare reserve in the south-east of Banks Peninsula (43° 50' South) (Fig. 1). It occupies most of the Ōtānerito Valley and part of the Stony Bay Valley. It stands on basaltic lava on the eroded flank of the Akaroa volcano. The reserve consists of a valley, a main summit and a high ridge. It rises from 20 to 806 metres above sea level. The valley is deeply cut by streams. Most are permanent and there are more than 40 waterfalls and several gorges.

Previously farmed, the bulk of the reserve was closed to stock in 1991 with some 100 hectares destocked four years earlier. Since that time it has been privately managed for the protection of native flora and fauna following a minimal intervention approach. There has been some weeding and virtually no planting, with reliance on allowing natural re-growth. However, there have been continuing efforts to eliminate feral goats and control possums.

The higher areas are exposed tussock and reverting pasture with small-leaved shrubs. At lower elevations, virtually all forest has regenerated since 19th century clearance. A few podocarps and beech survive from the original bush. Some 40 percent of Hinewai is regenerating native bush ranging from that under senescent gorse, through mature stands of kānuka to second-growth broad-leaf native plants and ferns. This regeneration is well advanced in the gullies. There are small areas of beech towards the heads of both valleys. A few kōwhai grow along the stream on the lower part of the valley.

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2 An Excel worksheet recording each collection, with additional information on habitat and substrate is available from the author.

Figure 1. Left: Hinewai Reserve; top right: Hinewai Lodge; bottom right: Hugh Wilson.

A large part of the reserve is dry for a significant part of the year which limits the growth of liverworts. There is a steep climatic gradient with average rainfall over the past decade ranging from 1,172 mm annually at 20 metres altitude to 1,842 mm at 600 metres. Just outside the reserve, and indicative of the variation, average rainfall between 2000 and 2004 is as low as 618 mm. More important for the survival of liverworts is the variation from year to year. This is shown in table 1.

Table 1. Variation in rainfall.

Location	**Elevation (metres) a.s.l**	**Average annual rainfall (mm)**	**Driest year annual rainfall (mm)**	**Wettest year annual rainfall (mm)**	**Year from which records started**
Skyline	600	1,842	1,353	2,298	1994
Manager's house	450	1,653	1,021	2,124	1988
Ōtānerito	20	1,172	923	1,559	1992
Ōtānerito Beach	5	948	755	1,089	2000

The deeper-cut streams and waterfalls provide habitats suitable for bryophytes as do several micro habitats that provide enough permanent moisture. In addition, there are a few species that are adapted to long dry periods.

HABITATS

The list shows species found in six habitat classes. These classes are somewhat arbitrary as the vegetation merges from one to another. It is also significant that micro climates occur within habitats and these have quite different levels and periods of humidity. The habitats identified for this study are:

Senescent gorse

In the lower valley there is an area of old man gorse that provides dense shade. Some vascular plants grow here but liverworts are limited to shade and dry tolerant *Metzgeria* species.

Kanuka-dominated regeneration

Tall kānuka areas have a limited variety and quantity of vascular plants. Here liverworts tend to grow on the deep litter and often on old gorse stems. A wider variety of bryophytes occur at the edge of the kānuka and at stream sides. There are very few liverworts on the live kānuka.

Regenerating native bush

The largest area of bush is regenerating broad leaf plants. These include māhoe, fuchsia, five-finger, kawakawa, lacebarks, some ongaonga. There is a good ground cover of ferns in most of this habitat.

The regeneration at the head of streams, such as that at Fuchsia Falls provides a generally damp habitat. However, there must be times during the year when the humidity is not sufficient to support liverworts. This limits the species variety and the quantity of moisture loving cryptograms.

Within the regenerating bush old farm track cuttings provide a unique environment. Where the banks of the cutting are shaded liverworts do grow and do not have to cope with being smothered by leaf litter. At the seaward end of the valley there are some mature kōwhai (*Sophora microphylla*) that are emergent over well grown broad leaf shrubs. The variety of liverworts here is limited, probably by the lower rainfall at this low elevation.

Beech forest

Beech (*Nothofagus fusca*) forest at the western end of the reserve has a limited variety of liverworts on the southern side of trunks and saplings and in the small depressions in the forest floor. It was noted that there are virtually no liverworts on twigs in this habitat, presumably because of the lack of moisture during part of the year.

Tussock/pasture with shrubs

The approach to the summit of Stony Bay Peak (Tarateretehu) from Purple Peak Saddle has rank pasture grasses and sparse tussock with areas of gorse, bracken and young native shrubs just developing. This vegetation is repeated on the ridge running seaward from the summit. On the northern boundary of Hinewai, from the main entrance towards the sea, is grazed pasture with small rocks and wind-shorn small leaved shrubs.

In these habitats the survival strategy for liverworts is to be out of the wind and sun. Some are hidden low down on the side of boulders and cliffs where they are sheltered by grass or low shrubs. Some of the shrubs, such as *Melicytus alpinus,* provide a suitable habitat inside their divaricating structure to allow liverworts and mosses to survive. On twigs within the shelter of these small leaved shrubs were found *Frullania patula* and two *Metzgeria* species.

Gorges

The gorge below Ghost Falls is a valley some hundred metres long with a permanent stream. The bottom of this valley is well shaded. Besides tree ferns there is a considerable quantity of bryophytes growing on the cliffs, stony stream sides and on the trunks of trees and tree ferns. Some uncommon liverworts were found here. Other gorges were not explored on this visit.

The pond and the adjacent area on the Brocheries Road (NW) boundary were examined and proved to be a liverwort desert. The pond itself holds no cryptograms whilst the surrounding area of grass and shrub must dry out periodically. Pasture grass at lower levels appears to provide no habitats suitable for liverworts. On some paths there are liverworts but these grow only where there is bush cover to maintain shade.

THE LIVERWORT FLORA

Not all areas were visited during the four day visit. Those selected are reasonably representative of the various habitats in the reserve. The Stony Bay Valley was not explored and may yet yield additional species.

When compared with the rest of Canterbury, liverworts appear to be well represented in Hinewai although relatively sparse compared with the moister areas to the west. Omissions are the larger liverworts, such as *Shistochila, Ballantiopsis* and *Bazzania*.

Of course this list is not the last word; no doubt additional species will be found. A list of Banks Peninsula records for which species have not been recorded for Hinewai is provided in Appendix 1. The following notes comment on the hornwort and liverworts recorded for the Hinewai Reserve:

Megaceros

The only hornwort species found was the common *Megaceros flagellaris.* Two collections of fertile material were made, both from soil at the track

side under kānuka-dominated regeneration. An earlier collection by Ella Campbell of *Megaceros arachnoideus* at 580 m on the south side of Stony Bay Peak has been included in this check list.

Acromastigum
Only one collection was made of this genus, and this was from the Ghost Falls Track. This was growing on a *Cyathea* trunk. It agrees with the description of *Acromastigum colensoanum* although it is smaller than usual. This is a common species nationally.

Asterella
Two collections were made of the nationally common *Asterella tenera*, both on soil.

Chiloscyphus
This genus is widespread within the reserve. Eight species of *Chiloscyphus* are recorded from this visit. Notable is the endemic *C. aperticaulis* found growing partially submerged on rock at a stream crossing on the Valley Track. This species was first described in 2004 from Gisborne and North Auckland regions and noted from Nelson. It was subsequently collected at Okarito. This Hinewai record extends the distribution to Canterbury.

C. perpusillus is an uncommon species that has been previously recorded from the Kinloch Road, Banks Peninsula. Two collections were made in Hinewai from soil on Valley Track (Fig. 2). These collections are close to agreeing with the description of *C. erosus*. Comparison with material held in herbarium CHR lead to the conclusion that the Hinewai specimens are *C. perpusillus.*

Chiloscyphus echinellus is noted as uncommon in some references but appears to be widespread in New Zealand (Fig. 3). Note this taxon is referred to as *Cyanolophocolea echinella* in some references. The remaining *Chiloscyphus* species on the checklist are common and have been previously reported from Canterbury.

Clasmatocolea
One collection of the common *Clasmatocolea inflexispina* was made from soil on the Big Kānuka Track.

Frullania
The six species of *Frullania* collected from Hinewai are all common and have previously been found in Canterbury. All six identified species were found in the Beech Forest on the West Track. *Frullania patula* was found in a wider range of habitats including the Mikimiki Knob and the track to Stony Bay Peak. In these exposed areas a notable habitat for this species is on the twigs inside divaricating shrubs as well as at the base of boulders and cliffs sheltered by rank grass.

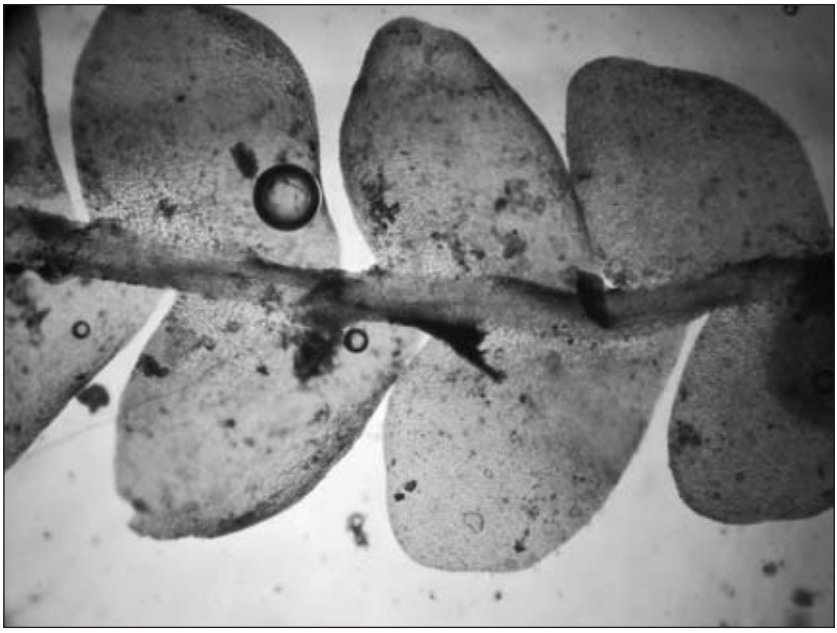

Fig. 2: The uncommon *Chiloscyphus perpusillus at Hinewai*

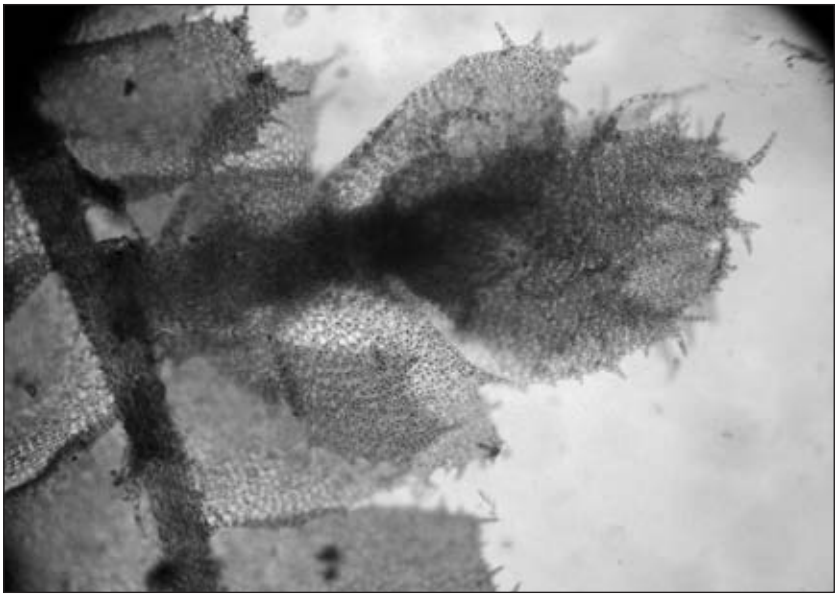

Fig. 3: *Chiloscyphus echinellus*

Two collections of *Frullania* from the lower end of the Valley Track are explanate. That is the characteristic leaf lobules are reduced to a single flap of leaf-like tissue. These have not been named to species level.

Heteroscyphus

One collection of just a few stems on soil on the Valley Track fits Hodgson's limited description of *Heteroscyphus compactus* (she describes it under *Chiloscyphus compactus*). To my knowledge this has previously been reported only from the North Island. The remaining four *Heteroscyphus* species are common and have been recorded previously for Canterbury.

Lejeuneaceae

Four species of this family were found during the January 2005 visit. *Austrolejeunea olgae, Diplasiolejeunea plicatiloba* and *Lejeunea flava* are common New Zealand liverworts and have been previously recorded for Canterbury. *Nephelolejeunea hamata* is less commonly recorded but is probably often missed because of its small size. *Drepanolejeunea aucklandica* and *Siphonolejeunea nudipes* were collected on the Kānuka Track by David Glenny in 1995[3].

Lepidolaena

Lepidolaena taylorii was collected from rock on the floor of the beech forest. This is a common species in Canterbury and elsewhere in New Zealand.

Lepidozia

Lepidozia laevifolia is a common plant throughout New Zealand. It was found on fuchsia trunks and well rotten logs in moist locations at the Fuchsia Falls and on the South Track.

Lunularia

Lunularia cruciata is common in New Zealand. It is not an easy plant to miss but was noted only once during the visit. This location was on rock, stream side, on the Valley Track.

Marchantia

Marchantia berteroana and *M. foliacea* are both recorded for Hinewai. Several collections were made of the latter species whilst *M. berteroana* was collected only from Waterfall Track. These are widely distributed through New Zealand.

Metzgeria

Metzgeria are plentiful in Hinewai. Three species have been identified. These have some defining characteristics and can be said to be in Hinewai with reasonable certainty. They are *M. flavovirens,* which turns blue on drying, *M*

3 WELT H010648 and H010650 respectively

furcata which has distinctive leaf like gemmae and *M. leptoneura* which is a pale yellow/green and has involute margins.

One collection from the base of a lacebark has dorsal leaf like gemmae. This is characteristics of *M. crassipula,* a relatively uncommon liverwort. Several other collections appear to be the same but cannot be determined with certainty. Other *Metzgeria* collected do not have distinctive characteristics and fall between those that have been identified.

Monoclea

Monoclea forsteri is common in the moister areas of Hinewai. It is common in Canterbury and elsewhere in New Zealand.

Pallaviciniaceae

The Hinewai collections for this family are all common and previously reported from Canterbury. They include *Hymenophyton, Pallavicinia and Symphyogyna* species.

Porella

Porella elegantula is a very common liverwort in New Zealand and has been reported from Banks Peninsula. It was not found during the visit. Subsequent forays by Hugh Wilson have discovered this near Boundary Falls on rock.

Plagiochila

The notable find in this genus is *Plagiochila banksiana*. This is an uncommon liverwort and was collected from three locations: from the spray area at Ghost Falls and from streams higher in the valley. *P. obscura* was also collected from moist rock at Ghost Falls. This is an uncommon liverwort but has been reported previously from Canterbury. Two other relatively common species, *P. lyallii,* and *P. deltoidea* were also found, all in relatively moist areas. *Plagiochila stephensoniana* was not collected during the visit but specimens from Ghost Falls and above Fuchsia Falls have subsequently been collected by Hugh Wilson. *Plagiochila fasciculata* was not recorded on this visit but has previously been collected by Alan Fife on the upper part of South Track.

Radula

Two common species of *Radula* were found. *Radula buccinifera* appears to be common at Hinewai whilst only one collection was made of *Radula uvifera.*

Riccardia

Two collections of *Riccardia* were made from separate streams, both from rocks that would have been inundated at times. The collection from Valley Track fits well with the description of *R. alba*. The other species, from Waterfall Track, fits less well but appears to be *R. alba. R. alba* is a common species in New Zealand although I have seen no previous record

for Canterbury.

Telaranea

I have followed Engel and Merrill (2004) in the identification of *Telaranea*. Three *Telaranea* were collected; all are common New Zealand species. *T. tetradactyla* is widespread within Hinewai; *T. herzogii* was found only in the Ghost Falls Gorge whilst *T. lindenbergii* was collected from Big Kanuka Track and Valley Track.

Zoopsis

One collection of *Zoopsis leitgebiana* was made from gorse stems under kanuka on South Track. This is a common species in New Zealand and has previously been reported in Canterbury.

ACKNOWLEDGEMENTS

I am indebted to Hugh Wilson for the information on rainfall at Hinewai as well as his suggestions and comments on earlier drafts of this paper. Hugh has also assisted by looking for and finding liverworts that were expected to be at Hinewai but were not found during the visit. Thanks are also due to David Glenny for confirming the identification of *Chiloscyphus aperticaulis* and *C. perpusillus*. These are lodged in the Lincoln Herbarium as CHR 571428 and CHR 571423 respectively.

REFERENCES

Engel J. J.; Smith Merrill, G. L. 2004: Austral Hepaticae. 35. A Taxonomic and Phylogenetic Study of *Telaranea* (Lepidoziaceae), with a Monograph of the Genus in Temperate Australasia and Commentary on Extra-Australasian Taxa. *Fieldiana Botany New Series, 44.*

APPENDIX 1

Species recorded from Banks Peninsula but not yet recorded from Hinewai

The following records have been noted from Banks Peninsula but were not collected on the January 2005 visit or noted from Hinewai in other records. They may yet be found within the reserve.

Hornworts

Megaceros denticulatus
Megaceros pellucidus
Phaeoceros coriaceus

Liverworts

Asterella australis
Cheilolejeunea novaezelandiae var. *grandistipulus*
Chiloscyphus chlorophyllus
Chiloscyphus novae-zeelandiae var. *novae-zeelandiae*
Diplophyllum domesticum
Fossombronia reticulata
Frullania falciloba
Frullania spinifera
Frullania subhampeana
Isotachis lyallii
Jamesoniella monodon
Lejeunea tumida
Lembidium nutans
Pachyschistochila colensoana
Plagiochila baileyana
Plagiochila intertexta (= *P. sinclairii*)
Plagiochila rutlandii
Rectolejeunea ocellata
Riccia crystallina
Symphyogyna undulata
Targionia hypophylla
Telaranea patentissima

APPENDIX 2

Hinewai – a Preliminary list of Hornworts and Liverworts

	Senescent Gorse	Kānuka-dominated regeneration	Regenerating native bush	*Nothofagus fusca* forest	Tussock/ Pasture with shrubs	Gorge, overhung (Ghost Falls)	Other records from Hinewai
Hornworts							
1 *Megaceros arachnoideus* (Steph.) Steph.							◆
2 *Megaceros flagellaris* (Mitt.) Steph.		◆					
Liverworts							
1 *Acromastigum* aff. *colensoanum* (Mitt.) A. Evans						◆	
2 *Asterella tenera* (Mitt.) R.M.Schust.			◆				
3 *Austrolejeunea olgae* (R.M.Schust.) R.M.Schust.		◆					
4 *Chiloscyphus aperticaulis* Engel		◆					
5 *Chiloscyphus bispinosus* (Hook. f. & Taylor) J.J.Engel & R.M.Schust.		◆	◆	◆	◆	◆	
6 *Chiloscyphus echinellus* (Lindenb. & Gottsche) Mitt.				◆			
7 *Chiloscyphus lentus* (Hook.f. & Taylor) J.J.Engel & R.M.Schust.		◆	◆	◆			
8 *Chiloscyphus muricatus* (Lehm.) J.J.Engel & R.M.Schust.		◆	◆			◆	

		Senescent Gorse	Kānuka-dominated regeneration	Regenerating native bush	*Nothofagus fusca* forest	Tussock/ Pasture with shrubs	Gorge, overhung (Ghost Falls)	Other records from Hinewai
9	*Chiloscyphus perpusillus* (Hook.f. & Taylor) J.J.Engel		◆					
10	*Chiloscyphus semiteres* (Lehm.) Lehm. & Lindenb. var. *semiteres*		◆					
11	*Chiloscyphus subporosus* var. *subporosus* (Mitt.) J.J.Engel & R.M.Schust.		◆		◆			
12	*Clasmatocolea inflexispina* (Hook.f. & Taylor) J.J.Engel		◆					
13	*Diplasiolejeunea plicatiloba* (Hook.f. & Taylor) Grolle				◆			
14	*Drepanolejeunea aucklandica* Steph		◆					
15	*Frullania aterrima* (Hook.f. & Taylor) Hook.f. & Taylor var. *aterrima*				◆			
16	*Frullania deplanata* Mitt.		◆		◆			
17	*Frullania monocera* (Hook.f. & Taylor) Taylor				◆			
18	*Frullania patula* Mitt.		◆	◆	◆	◆	◆	
19	*Frullania rostrata* (Hook.f. & Taylor) Hook.f. & Taylor				◆			
20	*Frullania solanderiana* Colenso			◆				
21	*Frullania* sp. (explanate)			◆				

		Senescent Gorse	Kānuka-dominated regeneration	Regenerating native bush	*Nothofagus fusca* forest	Tussock/ Pasture with shrubs	Gorge, overhung (Ghost Falls)	Other records from Hinewai
22	*Heteroscyophus allodontus* (Hook.f. & Taylor) J.J.Engel & R.M.Schust.			◆				
23	*Heteroscyphus biciliatus* (Hook.f. & Taylor) J.J.Engel		◆	◆				
24	*Heteroscyphus coalitis* (Hook.f.) Schiffn.			◆			◆	
25	*Heteroscyphus compactus* (Colenso) R.M.Schust.		◆					
26	*Heteroscyphus cuneistipulus* (Steph.) Schiffn.		◆	◆				
27	*Heteroscyphus normalis* (Steph.) R.M.Schust.		◆					
28	*Hymenophyton flabellatum* (Labill.) Trevis.			◆				
29	*Hymenophyton leptopodum* (Hook.f. & Taylor) Steph.						◆	
30	*Lejeunea flava* (Sw.) Nees			◆				
31	*Lepidolaena taylorii* (Gottsche) Trevis.				◆			
32	*Lepidozia laevifolia* (Hook.f. & Taylor) Taylor		◆	◆				
33	*Lunularia cruciata* (L.) Dumort.		◆					
34	*Marchantia berteroana* Lehm. & Lindenb.			◆				

		Senescent Gorse	Kānuka-dominated regeneration	Regenerating native bush	*Nothofagus fusca* forest	Tussock/ Pasture with shrubs	Gorge, overhung (Ghost Falls)	Other records from Hinewai
35	*Marchantia foliacea* Mitt.		◆	◆				
36	*Metzgeria* aff. *crassipilus* (Lindb.) Evans		◆	◆				
37	*Metzgeria flavovirens* Colenso	◆	◆	◆		◆	◆	
38	*Metzgeria furcata* (L.) Dumort.	◆	◆	◆	◆		◆	
39	*Metzgeria leptoneura* Spruce			◆	◆	◆	◆	
40	*Monoclea forsteri* Hook.			◆			◆	
41	*Nephelolejeunea hamata* Grolle		◆					
42	*Pallavicinia lyellii* (Hook.) Gray			◆				
43	*Pallavicinia xiphoides* (Hook. f. & Taylor) Trevis.						◆	
44	*Plagiochila banksiana* Gottsche var. *banksiana*		◆	◆				
45	*Plagiochila deltoidea* Lindenb.				◆			
46	*Plagiochila fasciculata* Lindenb.							◆
47	*Plagiochila lyallii* Mitt. var. *lyallii*			◆	◆		◆	
48	*Plagiochila obscura* Colenso						◆	
49	*Plagiochila stephensoniana* Mitt.			◆			◆	
50	*Porella elegantula* (Mont.) E.A. Hodgs.			◆				◆
51	*Radula buccinifera* (Hook.f. & Taylor) Taylor			◆				

		Senescent Gorse	Kānuka-dominated regeneration	Regenerating native bush	*Nothofagus fusca* forest	Tussock/ Pasture with shrubs	Gorge, overhung (Ghost Falls)	Other records from Hinewai
52	*Radula uvifera* (Hook. f. & Taylor) Taylor				◆			
53	*Riccardia alba* (Colenso) E.A.Brown		◆					
54	*Siphonolejeunea nudipes* (Hook. f. & Taylor) Herzog		◆					
55	*Solenostoma inundata* (Hook.f & Taylor) Mitt.							◆
56	*Symphyogyna hymenophyllum* (Hook.) Mont. & Nees		◆	◆			◆	
57	*Symphyogyna tenuinervis* (Hook. f. & Taylor) Grolle						◆	
58	*Telaranea herzogii* (E.A. Hodgs.) E.A. Hodgs.						◆	
59	*Telaranea lindenbergia* var. *lindenbergia* (Gott.) Engel & Merrill		◆					
60	*Telaranea tetradactyla* (Hook. f. & Taylor) E.A. Hodgs.		◆	◆			◆	
61	*Trichocolea rigida* R.M. Schust.						◆	
62	*Zoopsis leitgebiana* (Carrington & Pearson) Bastow		◆					