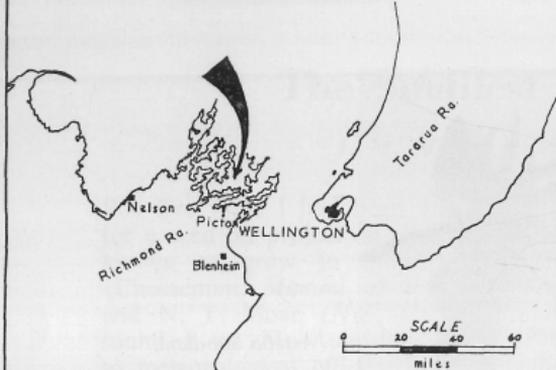
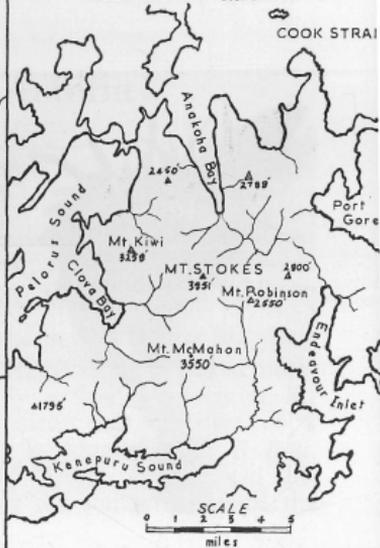


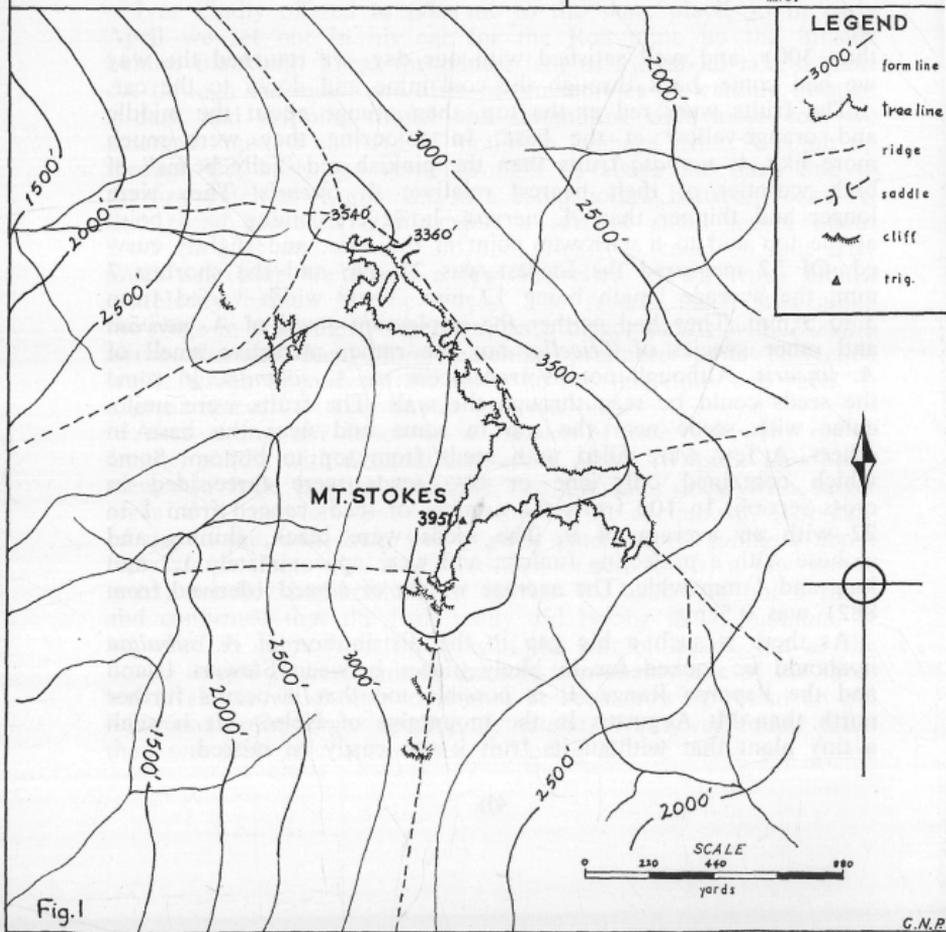
LOCALITY MAP 1



LOCALITY MAP 2



MT. STOKES,
MARLBOROUGH



The Vegetation and Flora of Mt Stokes

G. N. Park, Wellington

As Moehau is to the Coromandel Peninsula, so Mt Stokes is to the Marlborough Sounds. Each of these mountains stands apart from its neighbours, each rises steeply from the sea, and each has a special botanical significance. Moehau (2926 ft) carries the northermost alpine flora in New Zealand; its nearest neighbour with an alpine flora is 140 miles to the south (Pureora, 3825 ft). Mt Stokes (3951 ft) supports some $5\frac{1}{2}$ acres of alpine vegetation on its summit. The nearest area in the South Island with such vegetation (Richmond Ra.) is 35 miles distant, and the nearest in the North Island (Tararua Ra.) 50 miles distant. The flora of Mt Stokes contains plants characteristic of each of these areas. Thus the mountain is important as a link between the North Island and the rest of the South Island.

The rocks in the vicinity of Mt Stokes grade from greywacke (mainly at higher altitudes) to schist (mainly at lower altitudes) and are possibly of Carboniferous age. The large valleys that once existed on either side of Mt Stokes have been drowned following downwarping and tilting towards the north. Except at high altitudes most of the greywacke and schist is deeply weathered. There is very little erosion even on steep slopes.

The climate is probably similar to that of the Tararua Ra., with many gales from the west and south. At Manaroa, Clova Bay, $1\frac{1}{2}$ miles west of Mt Stokes, the average annual rainfall is $61\frac{1}{2}$ inches. Cloud covers the summit most days of the year.

Deer and goats have depleted both the forest understorey and the alpine vegetation. The high-altitude forests in particular are showing degradation following browsing of silver beech seedlings and saplings over a long period. At one time there were "large green tussocks" of *Chionochloa cheesemani* in the silver beech forest above 2800 ft (Martin 1932), but in 1956 A. P. Druce noted only mounds of litter marking the positions of the former tussocks. The only plants surviving then were a few perched on rocks. Mountain five-finger (*Pseudopanax colensoi*), once common on Mt Stokes (Cockayne 1928), appears to be extinct.

There have been two previous accounts of visits to Mt Stokes — one by W. Martin in *The Vegetation of Marlborough*, the other by J. A. Hay in Bulletin No. 23 (1950). The present account is based on two visits to the mountain via a northern route from Anakoha Bay. One day was spent studying the summit area in November 1966 and another in March 1967. Various members of the Victoria University of Wellington Biological Society, particularly Mr J. Christeller, helped in the study. Mr A. P. Druce made available his notes on a trip to the moun-

tain in 1956. For their generous hospitality and advice on the area I am grateful to Mr and Mrs J. Muldrew and Mr and Mrs F. Redwood of Anakoha Bay.

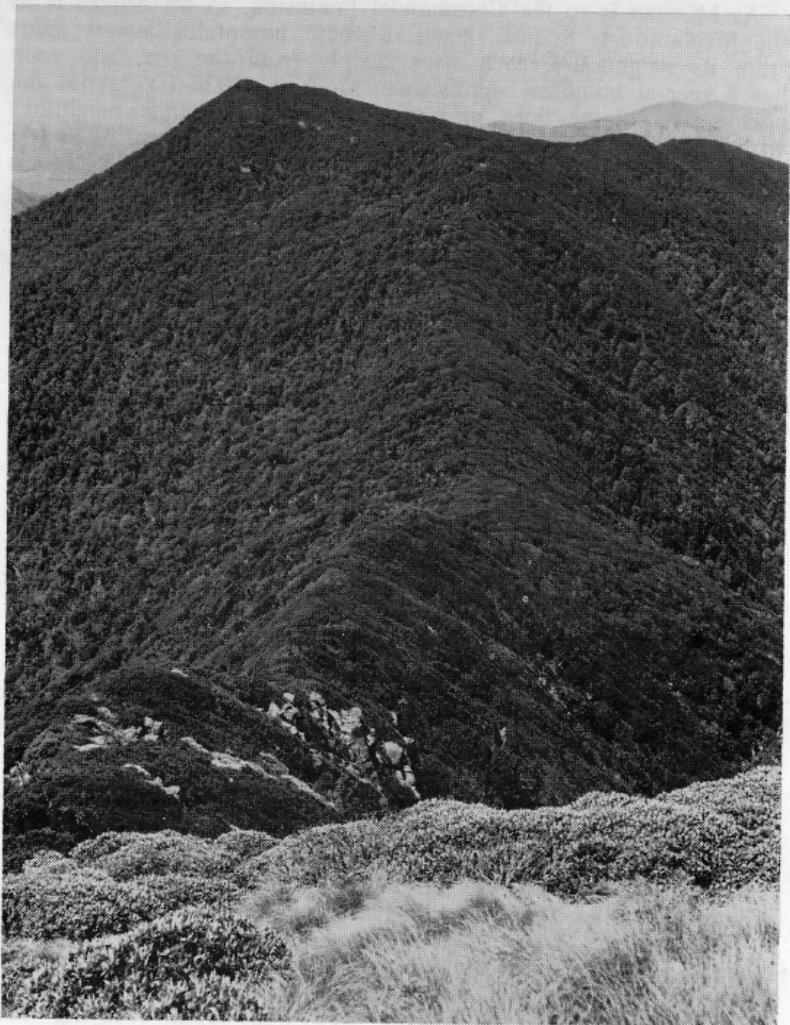


Photo: A. P. Druce, December 1956.

Fig. 2.—Looking south to Mt McMahon from Mt Stokes, showing silver beech forest and shrub-tussock-boulder field. Note the close canopy of the forest on the right-hand (west-facing) side of the ridge.

VEGETATION BELOW 3000 FT

Below 1500 ft only a few stands of forest are left. On the flats at the head of Anakoha Bay there is some secondary tawa/kohekohe forest with scattered poles and saplings of rimu, kahikatea and matai. Rimu-rata/hinau/tawa forest probably covered most of the lower slopes, with hard beech forest on the ridges. Above about 2000 ft on the Anakoha side silver beech is the main tree but on the Endeavour Inlet side red beech is at first more important. Hard beech and southern rata contribute to the canopies of these forests; kamahi is prominent in the upper understorey.

VEGETATION ABOVE 3000 FT

Silver beech forest (with open canopy)

This type of forest occurs in relatively sheltered sites on the sides of most ridges. The trees reach 50 ft and there are many gaps. The upper understorey contains scattered silver beech poles and broadleaf, but the lower understorey is made up of dense clumps of horopito and stinkwood. There are few ground plants, though seedlings of *Senecio elaeagnifolius* are not uncommon in areas opened by windfalls. Towards ridge tops the forest decreases in height and the understorey vegetation becomes sparse. Canopy gaps, fewer in numbers than below, may contain scattered plants of leatherwood (*Olearia colensoi*) and one or two small-leaved shrubs (*Pittosporum rigidum*, *Coprosma* sp. a).

Short silver beech forest (with closed canopy)

Though found on most ridge tops this forest has its greatest development on those ridges that run at right angles to the prevailing southerly and westerly wind directions. The trees are usually 20—25 ft high but may be as low as 10 ft. The wind-shorn and striated canopy shows very clearly in aerial photographs. Associated with the silver beech, at subcanopy level, are scattered trees of broadleaf, Hall's totara and *Senecia elaeagnifolius*. Under the dense canopy there is a sparse understorey of small-leaved shrubs, mainly *Coprosma colensoi* and *Myrsine divaricata*. The large, irregular trunks of the silver beech trees are covered with mosses and lichens (especially *Sticta* spp.).

Short silver beech/leatherwood forest

At high altitudes on the less exposed sides of ridges widely spaced trees of silver beech with asymmetrical crowns form an upper canopy layer at 25—30 ft. Hall's totara is occasionally present. The lower canopy layer may be closed or partly open. Where it is closed, it is dominated by leatherwood; where it is partly open, gaps in a canopy of leatherwood are filled by the ferns *Polystichum vestitum* and *Histiopteris incisa*. The leatherwood is unhealthy and dying back; it was probably dominant everywhere in the lower canopy at one time.

Silver beech scrub

In the area between the saddle (3360 ft) and the summit, where there is a high water table, silver beech forms an almost impenetrable scrub. Other species associated with the beech are leatherwood, *Myrsine divaricata* and *Coprosma* sp. (a). The ground is almost completely covered by the sedges *Carpha alpina* and *Oreobolus pectinatus*, and by other herbs.

A different kind of silver beech scrub, sometimes only 3 ft high and with practically no ground cover, is found along forest margins adjoining tussock land.

Leatherwood scrub

It is only in a few well drained and rocky sites near and south of the summit that leatherwood scrub is well developed. The two snow tussocks and their hybrids, along with the herbs *Celmisia rutlandii* and *Ranunculus verticillatus*, are the only other plants of importance. At the tree line in many places there is a fringe of leatherwood scrub with a good deal of flax in it.

Shrub-tussock-boulder field and tussock-boulder field

On undulating land immediately above the tree line south of the summit the vegetation is dominated by scattered individuals and clumps of leatherwood and snow tussock. These are about 2 ft tall and are interspersed among boulders. The tussocks are heavily browsed and much of the leatherwood is in poor condition. Flax and *Coprosma* sp. (a) are present, mainly in depressions where there is a more continuous cover of plants. Point analysis (50 points at four-pace intervals) gave the following percentages for crown cover, litter and bare ground in this vegetation.

<i>Chionochloa pallens</i>	.....	.....	24
<i>Olearia colensoi</i>	.....	.....	20
<i>Coprosma</i> sp. (a)	.....	.....	4
Other plants (herbs)	.....	.....	10
Dead <i>Olearia colensoi</i>	.....	.....	8
Litter	.....	.....	12
Boulders	.....	.....	22

Further from the tree line tussocks increase at the expense of shrubs, but there are few areas where they provide anything like a complete cover. Point analysis (as above) of this tussock-boulder field gave the following results.

<i>Chionochloa pallens</i>	.....	.....	48
<i>Poa colensoi</i>	.....	.....	8
Other plants (mainly herbs)	.....	.....	10
Litter	.....	.....	12
Boulders	.....	.....	20
Bare ground (other than boulders)	.....	.....	2



Photo: A. P. Druce, December 1956.

Fig. 3.—The summit of Mt Stokes, looking south, showing tussock/sedge land and silver beech forest, with margin of leatherwood scrub.

Shrub-tussock/sedge land and tussock/sedge land

On imperfectly drained slopes, east and north-west of the main summit ridge, the important plants are snow tussock, *Coprosma* sp. (a), *Poa colensoi* and *Carpha alpina*. The coprosma varies widely in its contribution to the cover; it is unpalatable to deer and goats and has probably increased relative to the tussock, which is heavily browsed. On the eastern side of the summit ridge the slopes are eroded by water channels and there is little tussock. Point analysis (as above) gave the following results for a stand on the exposed north-west slope of the summit ridge. (The cover of coprosma decreases upslope from the tree line here and at the site chosen its contribution is not great. However the plant is still of physiognomic importance.)

<i>Carpha alpina</i>	.....	.....	28
<i>Chionochloa pallens</i> × <i>C. flavescens</i>	.....	.....	16
<i>Poa colensoi</i>	.....	.....	12
<i>Coprosma</i> sp. (a)	.....	.....	6
Other plants (herbs)	.....	.....	6
Litter	.....	.....	12
Bare ground	.....	.....	20

On the exposed northern end of one summit ridge the vegetation is short and open. Snow tussock, though heavily browsed, is still physiognomically important. Many herbs are present between the tussocks. Some of these, e.g. *Anisotome aromatica*, *Gingidium deltoideum*, *Gentiana patula* and *Poa colensoi*, grow in a shallow

soil of sandy loam texture; others, e.g. *Drapetes laxus*, *Epilobium pernitens* and *Raoulia grandiflora*, grow amongst gravel and stones on an erosion pavement. Point analysis (100 points at four-pace intervals) in a stand on the north-west slope of the summit ridge, upslope from the stand analysed above, gave the following results.

<i>Poa colensoi</i>	18
<i>Chionochoa pallens</i> × <i>C. flavescens</i>	16
<i>Carpha alpina</i>	16
Other plants (herbs)	6
Litter	14
Bare ground	30

Cushion herbfield

In the saddle (3360 ft) north of the summit *Donatia novae-zelandiae* and *Oreobolus pectinatus*, growing on peat, form a well developed cushion herbfield. The community occurs on 5–10° slopes and extends well down on the south-western side of the saddle. It is bordered by a narrow belt of scrub, either leatherwood or silver beech. Shallow water channels and tarns are common in this area. Point analysis (100 points at two-pace intervals) gave the following percentages for leaf cover, litter and open water.

<i>Donatia novae-zelandiae</i>	61
<i>Oreobolus pectinatus</i>	27
Other plants (herbs)	5
Litter	3
Open water	4

THE FLORA

The following notes on the subalpine and alpine flora of Mt Stokes have been supplied by Mr A. P. Druce.

Of the 136 higher plants listed below the majority (102) are widely distributed in both North and South Island mountains. The plants with restricted or discontinuous distributions found on Mt. Stokes fall into a number of groups. The first and largest comprises 18 species or varieties restricted to the South Island.

<i>Aciphylla aurea</i>	¹ <i>Coprosma pseudocuneata</i> var.
¹ <i>Agrostis dyeri</i> var.	³ <i>Donatia novae-zelandiae</i>
² <i>Anisotome haastii</i> var.	<i>Euphrasia monroi</i>
¹ <i>Aristotelia fruticosa</i> var.	<i>Forstera</i> sp. (unnamed)
<i>Astelia</i> sp. (unnamed)	<i>Gingidium deltoideum</i>
<i>Carex cockayneana</i>	<i>Hierochloa</i> sp. (unnamed)
¹ <i>Celmisia hieracifolia</i> var.	<i>Phyllacne</i> sp. (unnamed)
² <i>C. macmahonii</i> var. <i>macmahonii</i>	¹ <i>Rubus cissoides</i> var.
<i>C. rutlandii</i>	<i>Schizeilema roughii</i>

¹A different var. of the sp. occurs in the North Island.

²The var. on Mt Stokes appears to be endemic.

³Two unconfirmed records from the North Island — Mt Holdsworth and Field Pk. (Cheeseman 1925, Zotov 1938).



Photo: A. P. Druce, December 1956.

Fig. 4.—*Celmisia hieracifolia* on Mt Stokes.

The second group comprises six species widely distributed in the South Island but restricted to the Tararua Ra. in the North Island.

Celmisia sp. (unnamed)

Coprosma ciliata

¹*Dracophyllum uniflorum*

Lyperanthus antarcticus

Notodanthonia nigricans

²*Oreobolus strictus*

¹Oliver (1952) and Allan (1961) are incorrect in stating that this sp. occurs north of the Tararua Ra.

²Two unconfirmed records from north of the Tararua Ra. (Cheeseman 1925).

By way of contrast, the six species of the third group have *not* been found in the Tararua Ra., though present both north and south of it.

Bulbinella hookeri

¹*Coprosma linariifolia*

Dacrydium laxifolium

Drapetes laxus

²*Herpolirion novae-zelandiae*

Uncinia longifructus

¹Present in the Wairarapa, east of the Tararua Ra.

²One imprecise record from the Tararua Ra. (Aston 1911).

Two common North Island plants that may not occur beyond Mt Stokes in the South Island are *Pittosporum rigidum* and *Senecio elaeagnifolius* var. *P. rigidum* is said to occur in N.W. Nelson (Allan 1962) but Cooper (1956) lists no localities in the South

Island other than Mt Stokes. Allan (1962) restricts *S. elaeagnifolius* to the North Island but plants from Mt Stokes are very similar indeed to plants from the Tararua Ra. However, plants from these areas — also Mt Egmont — may be distinguished from typical *S. elaeagnifolius* of the Ruahine Ra. by their broader leaves.

The two kinds of snow tussock found on Mt Stokes appear to be the same as the two kinds found in the Tararua Ra., and on present evidence they appear to be restricted to these two areas. However, further investigation may show them to be present elsewhere in the north of the South Island. (They have not been seen on any Botanical Society trip there; the widespread broad-leaved snow tussock usually called *Chionochloa flavescens* in the South Island is certainly not *C. flavescens* as found in the Tararua Ra., the type locality.)

SUBALPINE AND ALPINE FLORA OF MT STOKES INDIGENOUS VASCULAR PLANTS

Seen by A. P. Druce and/or G. N. Park unless otherwise indicated, e.g. (Martin (1932)). Numbers refer to specimens in Botany Division Herbarium, Lincoln. An asterisk indicates that the species has not previously been recorded from Mt Stokes.

TREES AND SHRUBS

- **Alseuosmia pusilla*
- Aristolelia fruticosa* var. (179407)
- **Cassinia vauvilliersii* (179408)
- Coprosma ciliata* (165338)
- C. colensoi* (incl. *C. banksii*)
- **C. depressa* (?)
- C. foetidissima* — stinkwood
- **C. linariifolia*
- C. pseudocuneata* var. (165339)
- C. pumila*
- C. sp. (a)* (unnamed, included in *C. parviflora* as var. *dumosa* by Cheeseman, 1925, and Allan, 1961) (165341, 179409)
- C. sp. (b)* (unnamed, included in *C. parviflora* by Oliver, 1935, and others) (179410—12)
- Cordyline indivisa* (Martin 1932)
- Cyathodes empetrifolia*
- C. dealbata* (*C. pumila*)
- **Dacrydium laxifolium*
- Dracophyllum filifolium* (var. *colinum*?)
- **D. uniflorum*
- Elytranthe colensoi* (Hay 1950)
- Gaultheria sp.* (*G. depressa* agg.)

- **Griselinia littoralis* — broadleaf
- Metrosideros umbellata* — southern rata
- Myrsine divaricata*
- **M. nummularia*
- **Neomyrtus pedunculata*
- Nothofagus fusca* — red beech
- N. menziesii* — silver beech
- Olearia colensoi* var. *colensoi* — leatherwood
- Pentachondra pumila*
- Phyllocladus alpinus* (Cockayne 1928, Hay 1950)
- Pimelea longifolia* (165337)
- Pittosporum rigidum* (165340)
- Podocarpus hallii* — Hall's totara
- Pseudopanax anomalum*
- P. colensoi* (Cockayne 1928). (It is not known whether the species seen was *P. colensoi* s.s. or an unnamed one at present included in *P. colensoi*)
- Pseudowintera colorata* — horopito
- Senecio elaeagnifolius* var. (165342)

LIANES

- **Rubus cissoides* var.

FERNS AND LYCOPODS

- Asplenium* sp. (*A. flaccidum* agg.)
Blechnum discolor
 **B. penna-marina*
 **B. procerum* (*B. minus*)
Cyathea colensoi
 **C. smithii*
 **Grammitis armstrongii* (*G. pumila*)
 **G. billardieri*
Histiopteris incisa
 **Hymenophyllum armstrongii*
 **H. multifidum*
 **H. rarum*
H. sanguinolentum (incl. *H. villosum*)
Hypolepis millefolium
Lycopodium australianum
 **L. fastigiatum*
 **L. scariosum*
L. varium (incl. *L. billardieri*)
Polystichum vestitum
Todea superba

ORCHIDS

- Aporostylis bifolia*
 **Chiloglottis cornuta*
Corybas oblongus (Martin 1932)
C. trilobus
 **Lyperanthus antarcticus*
 **Prasophyllum colensoi*
 **Pterostylis irsoniana*
 **P. venosa*
Thelymitra sp. (There may be more than one present)

GRASSES

- **Agrostis dyeri* var. (179415)
 **A. perennans* (86286)
Chionochloa cheesemani—narrow-leaved bush tussock
 **C. flavescens* s.s. — Tararua broad-leaved snow tussock
 **C. pallens* var. *pallens* — Tararua narrow-leaved snow tussock
C. p. var. p. × *C. flavescens* s.s. (179417)
 **Deyeuxia aucklandica* (86282)
Hierochloa sp. (unnamed, aff. *H. frazeri*) (86285, 165336)
Microlaena avenacea
Notodanthonia gracilis (86281, 179405)
 **N. nigricans* (179729—30)
 **Poa breviglumis* s.s. (179392)
P. colensoi var. *colensoi* (86283, 86288, 179394)
P. sp. (unnamed, aff. *P. breviglumis*) (86287)

SEDGES AND RUSHES

- **Carex acicularis*
C. cockayneana (179416)
C. forsteri (25122)
Carpha alpina
Juncus antarcticus
 **J. novae-zelandiae*
 **Luzula migrata*
 **L. picta* s.s.
Oreobolus pectinatus
 **O. strictus*
 **Scirpus habrus* (112729, 129397)
 **Uncinia astonii* (179399—400)
U. caespitosa s.s. (179395—6)
U. filiformis (179393)
U. longifructus
 **U. silvestris* s.s. (?)

HERBS (OTHER THAN THOSE LISTED ABOVE)

- Acaena anserinifolia* (incl. var. *sericeinitens*)
Aciphylla aurea
Anisotome aromatica
A. haastii var. (112780)
 **Astelia fragrans*
A. sp. (unnamed, aff. *A. nervosa*) (165343)
Bulbinella hookeri (112778)
Cardamine sp. (*C. debilis* agg.)
Celmisia hieracifolia var. (112781)
 Whether var. *oblonga* — type loc. Mt Stokes — can be separated out from the rest of this variable sp. in the South Island is unknown)
C. macmahonii var. *macmahonii* (type loc. Mt Stokes)
C. rutlandii (type loc. Mt Stokes) (112776)
C. sp. (unnamed, aff. *C. gracilentia*)
Donatia novae-zelandiae
 **Drapetes laxus* (179391, 180730) (There may be another sp. present as well)
 **Epilobium cockayneianum*
E. linnaeoides (This is considered to be distinct from *E. pedunculare* s.s.)
E. pernitens
E. sp. (unnamed, at present placed as var. *brunnescens* of *E. pedunculare*)
Euphrasia monroi
 **Forstera* sp. (unnamed) (179404)
 **Gentiana patula* (165843—5) (Hay 1950 reports two spp. present)
Gingidium deltoideum (112779)

**Helichrysum bellidioides* s.s.
 **H. filicaule*
 **Herpolorion novae-zelandiae*
Lagenophora petiolata
 **L. pumila* s.s.
Luzuriaga parviflora
Nertera sp. (unnamed, included in
N. dichondraefolia by Allan,
 1961)
Oxalis lactea
Phormium colensoi

Phyllacne sp. (unnamed, aff. *P.*
colensoi) (180733)
 **Plantago novae-zelandiae*
Ranunculus verticillatus (*R. clivalis*)
 **Raoulia glabra*
 **R. grandiflora*
Schizeilema roughii
Senecio lagopus
Stellaria parviflora (incl. *S. minuta*,
 type loc. Mt Stokes) (179401)
Viola filicaulis

The following records of plants from Mt Stokes are not accepted:

Aciphylla colensoi (Martin 1932,
 Hay 1950) = *A. aurea*
Alseuosmia quercifolia (Cheeseman
 1925) = *A. pusilla*
Anisotome pilifera (Dawson 1961,
 p. 32, in error)
Astelia solandri? (Hay 1950) =
A. sp. (unnamed)
Celmisia graminifolia (Hay 1950)
 = *C. sp.* (unnamed)
Chionochloa rigida (Hay 1950, as
Danthonia rigida = *C. pallens*
 var. *pallens?*)
C. rubra (Martin 1932, as red
 snowgrass, *Danthonia raoulii*
 var.) = *C. pallens* var. *pallens?*
Coprosma parviflora (Martin 1932,
 Oliver 1935, Hay 1950) = *C.*
sp. (a) and/or *C. sp.* (b) (un-
 named)
Dracophyllum rosamarinifolium?
 (Hay 1950) = *D. uniflorum*
D. urvilleanum (Oliver 1952 = *D.*
filifolium?)
Drapetes dieffenbachii (Hay 1950)
 = *D. laxus?*

Epilobium pedunculare (Hay 1950)
 = *E. sp.* (unnamed)
Hymenandra sp. (Hay 1950) =
Pittosporum rigidum?
Hypolepis tenuifolium (Martin
 1932, deciduous summer-green
 fern) = *H. millefolium*
Luzula campestris (Hay 1950) =
L. migrata?
Nertera dichondraefolia (Martin
 1932, Hay 1950) = *N. sp.* (un-
 named)
Phyllacne colensoi (Hay 1950) =
P. sp. (unnamed)
Pittosporum divaricatum (Martin
 1932) = *P. rigidum*
Ranunculus nivicola (Cheeseman
 1914, Martin 1932) = *R. verti-*
cillatus
Senecio bellidioides (Martin 1932)
 = *S. lagopus?*
 Nomen nudum: "Leptopteris inter-
 media" (Martin 1932) = *Todea*
superba

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Index to Bulletins 1-35

WITH this bulletin is being issued separately a cumulative author and title index to the current and all past numbers, a total of 35 issues which appeared over a period of 27 years. During this time there has been considerable change, both in format and content, in the Society's publication.

Under the editorship of Dr L. B. Moore, the *Wellington Botanical Society Bulletin* began in wartime years (June 1941) as a "modest cyclostyled pamphlet", appearing twice or three times yearly, in which reports of field trips and addresses given at the Society's meetings mingled with news of members, notes on cultivation of native plants, and occasional contributed articles. (For a humorous account of some of the trials of those early years see Bulletin No. 32, pp. 21—22.) Subsequent issues became more substantial, and after the appearance of No. 19 in August 1948 the decision was made to change to a printed format. The first printed issue (No. 20) appeared in February 1949 under the guidance of a new editor, Mr A. P. Druce. At first the printed bulletins continued to appear twice yearly, then annually; reports of field trips and addresses were gradually omitted (being later taken up in the cyclostyled newsletter) and the bulletin came largely to consist of descriptive articles of a high standard, though small and informal notes were still valued. Following the appearance of Bulletin No. 33 in November 1967, the largest and most ambitious issue to date which came after a gap of four years, Mr Druce relinquished the editorship from pressure of work, having established a firm place for the Society's publication in N.Z. botanical literature.

Of the early cyclostyled issues, only Nos. 1, 2, 5, and 14—19 are still available in reasonable number; Nos. 4, 6, 8 and 10 are completely out of print and the remainder very nearly so. Of the printed issues, Nos. 22, 26 and 31 are also out of print and 20, 21, 24 and 27 nearly so, but there are still fair stocks of the remaining numbers. The dates of issue are listed at the beginning of the index.