Species of *Celmisia* Indigenous to Marlborough, with Descriptions of New Species and Varieties.

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INTRODUCTION.

So mountainous and comparatively difficult of access is a great part of the Province of Marlborough that much of its area has not hitherto been botanically explored at all, or at most it has been examined very superficially, notwithstanding the fact that many New Zealand botanists have paid one or more visits to some part of the region.

The following paper is based on a fairly intensive examination of the plant life of the province spread over a period of more than seven years, and deals in particular with the numerous species and varieties of *Celmisia* indigenous to the area, of which not a few are new to science.

In addition to regular field-work, continuous observation has been made of the behaviour of these plants in cultivation, almost all of which have been grown for a number of years in the gardens of Mr J. H. Hadfield, Mr H. F. Hursthouse and the writer in Blenheim. As a result directly and indirectly of this work three supposed varieties have been proved to be ephaphonic variants of known forms. Little doubt is entertained of the genetic distinctness of all forms listed, but in one or two instances it seems possible that the form listed may be capable of resolution into two or more distinct jordanons.

It is to be noted, however, that a few portions of the province, more particularly the slopes of both the Inland and Seaward Kaimouras flanking the Clarence River, require much more careful and extensive examination than either time or opportunity has made possible.

BOTANICAL SUBDIVISIONS OF THE PROVINCE OF MARLBOROUGH.

All that part of Marlborough west of the Wairau River and north from Tophouse belongs to the Sounds-Nelson Botanical District as defined by Cockayne and Allan (1914, pp. 19-20). The boundary-line between the North-eastern and the North-western Botanical Districts has been defined by Cockayne (1916, p. 195) as following the line marking the average limit of the western rainfall between Hanmer in the south and Lake Rotoiti in the north, but its position has never been more precisely determined. In a forthcoming paper the writer hopes to review the evidence on which he bases his view that that portion of Marlborough comprising the mountainous country of the Bounds and Raglan Ranges forms part of the North-western District. Thus, for the purposes of this paper, the western boundary of the North-eastern District is deemed to be a line following the Wairau River from its mouth as far as Mount Patriarch, then turning east to Mount Bounds and following the Waihopai
River to its source, and thence south by the Acheron River to the Clarence River. Though not strictly forming part of the Province of Marlborough, it has been found expedient to include the St. Arnaud Range in the scope of the present review. Thus the province has been subdivided so as to incorporate portions of three botanical districts, each with species and varieties not to be found elsewhere in Marlborough.

**Species and Varieties of Celmissia Indigenous to Marlborough.**

(A) Restricted in Marlborough to the Sounds-Nelson Botanical District.

* (1) Celmissia cordatifolia Buch.
* (2) Celmissia cordatifolia Buch. var. similis var. nov.
(3) Celmissia hieracifolia Hook. f.
(4) Celmissia hieracifolia Hook. f. var. oblonga T. Kirk.
* (7) Celmissia Rutlandii T. Kirk.

(B) Restricted in Marlborough to the North-western Botanical District.

(1) Celmissia bellidioides Hook. f.
* (2) Celmissia cordatifolia Buch. var. Brockettii var. nov.
* (3) Celmissia coriacea Raoul var. lancifolia Cheeseem.
(4) Celmissia intermedia Petrie.
* (5) Celmissia lateralis Buch. var. villosa Cheeseem.
(6) Celmissia Traversii Hook. f.

(C) Restricted in Marlborough to the North-eastern Botanical District.

* (1) Celmissia Cockayniana Petrie.
* (2) Celmissia insignis sp. nov.
(3) Celmissia Mackawi Raoul (?).
* (4) Celmissia Monroi Hook. f.
* (5) Celmissia Monroi Hook. f. var. conspicua var. nov.

(D) Indigenous in Marlborough to all three Botanical Districts.

(1) Celmissia alpina T. Kirk.
(2) Celmissia gracilenta Hook. f.
(3) Celmissia graminifolia Hook. f.
(4) Celmissia laricifolia Hook. f.
(5) Celmissia sessiliflora Hook. f.
(6) Celmissia spectabilis Hook. f.

(E) Restricted in Marlborough to the North-western and Sounds-Nelson Botanical Districts.

(1) Celmissia Allanii Martin var. canescens var. nov.
(2) Celmissia discolor Hook. f.
(3) Celmissia Monroi Hook. f. var. robusta var. nov.
(4) Celmissia Sinclairii (Hook. f.) Martin.
(5) Celmissia spectabilis Hook. f. var. albomarginata var. nov.
(6) Celmissia spectabilis Hook. f. var. angustifolia var. nov.
(7) Celmissia viscosa Hook. f.
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(F) Restricted in Marlborough to the North-western and North-eastern Botanical Districts.
(1) Celmisia coriacea Raoul.

(G) Restricted in Marlborough to the North-eastern and Sounds-Nelson Botanical Districts.
(1) Celmisia incana Hook. f. var. nivalis var. nov.

Of the 33 species and varieties listed above as indigenous to Marlborough 3 are endemic to the North-western District, 4 to the North-eastern, and 5 to the Sounds-Nelson. These are marked with an asterisk. The total number of species and varieties for each of these areas in Marlborough is 20, 13, and 21 respectively. Thirteen are recorded from Marlborough for the first time, and 9 are new to science.

**List of Hybrids Observed in Marlborough.**

1. Celmisia discolor × C. Allanii var. canescens.
2. Celmisia discolor × C. intermedia.
3. Celmisia hieracifolia × C. incana var. nivalis.
5. Celmisia insignis × C. sessiliflora.
7. Celmisia Sinclairii × C. Allanii var. canescens.
12. Celmisia spectabilis × C. spectabilis var. angustifolia.
13. Celmisia spectabilis var. angustifolia × C. spectabilis var. albumarginata.
15. Celmisia Traversii × C. Monroi var. robusta.
16. Celmisia viscosa × C. sp.

**Incidence of Hybridism Amongst the Species and Varieties of Celmisia Indigenous to Marlborough.**

**Evidence of Hybridism.**

In almost every locality where a considerable number of individuals of two or more jordanons of Celmisia occupy the same or contiguous habitats, hybrid individuals and less common hybrid swarms are encountered. Field evidence alone has been relied on in determining the parentage of each cross, but usually this has been such as to eliminate all doubt as to the correctness of the identifications. As a safeguard, however, no record has been entered save where my field companion Mr J. H. Hadfield and I have independently arrived at the same conclusion.

The usual field evidence sought for in each instance has been:—

1. Are the supposed parental forms growing in the neighbourhood of the supposed hybrid?
2. Are the characters of the reputed hybrid intermediate between those of the parental forms?
3. Are there in the neighbourhood other species or varieties from which the hybrid characters could have been derived?

4. Are there in the neighbourhood other plants so similar as to constitute a distinct jordanon; is the plant a distinct isolated individual; or is it one of a series of forms intermediate between species present in the area?

The following cases are worthy of record by way of illustration:

1. It was suggested to me that *Celmisia insignis* might prove to be a hybrid between *C. Lyallii* and *C. longifolia*. The fact that *C. Lyallii* has nowhere been seen in Marlborough and that *C. longifolia* has nowhere been gathered in the area of distribution makes it clear that the suggested hybrid origin is incorrect. The further fact that numerous similar individuals abound proves the existence of a valid jordanon.

2. *Celmisia cordatifolia* var. *Brocketti* was queried as a possible cross between *C. cordatifolia* and *C. spectabilis*. In this case the latter plant does grow nearby, but the former does not, being restricted to the Sounds-Nelson Botanical District. All plants observed were as nearly identical as plants ever are in nature, and they were unreservedly given varietal rank.

3. During a whole day spent on the eastern slopes of the Red Hills the only species of *Celmisia* observed were *C. spectabilis* var. *albomarginata* and *C. gracilenta*. The discovery of a solitary individual combining the slender growth form and scape of the former with the more distinctive characters of the latter left small room for doubt as to its hybrid origin.

4. On the slopes of Mount Patriarch, at a height of 4000ft. and more, there exists a huge swarm of individual plants all attributable to *C. spectabilis* or its varieties, yet no two alike. Careful observation revealed the fact that three distinct jordanons of *C. spectabilis* which occur in Marlborough had here met. The result was a very complex swarm of hybrids, the influence of each parental variety being very evident.

**Hybrid Swarms.**

Hybrid swarms in Marlborough are infrequent and have been observed only in the case of the following species and varieties. It is noteworthy that *Celmisia spectabilis* in one or other of its three local varieties is involved in each instance.

(1) *Celmisia spectabilis* × *C. Traversii.*

Such a swarm occurs near Mount Blowhard on the Raglan Range.

(2) *Celmisia spectabilis* × *C. spectabilis* var. *angustifolia*.

A small swarm of this parentage occurs on Mount Schiza. Many plants of the same parentage form part of a huge and complex swarm on Mount Patriarch.

(3) *Celmisia spectabilis* × *C. spectabilis* var. *albomarginata.

*Celmisia spectabilis* var. *angustifolia* × var. *albomarginata.*
As already stated, a complex swarm occurs about 4000-4500ft. altitude on Mount Patriarch in which all three local varieties of C. spectabilis have met and given rise to a numerous progeny in which the influence of each parental variety is obvious. The last-named cross forms a smaller swarm on the St. Arnaud Mountains.

Mimicry.

Dr. H. H. Allan (1931, pp. 468-9), in discussing the occurrence of "mimies" and "doubles," instances the case of × Celmisia linearis, the parentage of which is assigned in some cases to Celmisia argentea × longifolia and in others to Celmisia sessiliflora × longifolia; but as C. longifolia as hitherto understood in New Zealand is a linnaean involving many distinct jordanos (and I think species) of which several are involved in various parts of New Zealand in the C. linearis hybrids, it is clear that plants attributable by herbarium methods to × C. linearis may have quite a variety of origins, as Cockayne and Allan have already indicated (1934, p. 45, 47). On the summit of the Mount Harkness ridge, at a height of 4600ft., Celmisia sessiliflora meets and crosses with C. insignis, a plant with a similar life-form to C. longifolia, though by no means closely related to it. The resulting progeny answers quite satisfactorily to × Celmisia linearis, a plant not hitherto noted in Marlborough. Here then is a further case of mimicry between hybrids genetically distinct.

The 16 hybrid groups recorded above include 15 new to the New Zealand flora. Cockayne and Allan (1934, p. 47) record C. longifolia × Monroi, a cross not noted by me but involving a plant practically endemic to Marlborough.

NOTES ON THE EPHARmony OF Several Species and Varieties.

1. Celmisia Allanii var. canescens.

When cultivated in a moist and shady corner of my garden plants of this variety developed leaves twice their normal length without increase in width, and spaced along the stem instead of remaining tufted at the end in the normal manner.

2. Celmisia Monroi.

Hooker's Marlborough plants of this species were obtained by Monro at Upton Downs. All plants noted by me in that locality grow on the steep, shaded banks of a stream and lack the customary rigidity of the leaf. The leaves are much longer (18 inches and more) than is usual on plants growing in the open, and are distinctly petiolate. The virtual type at Kew is probably one of these shade-epharmones. See also notes by L. Cockayne (1916, pp. 194-5).

3. Celmisia Monroi var. conspicua.

On coastal cliffs from Kekerangu north to Clifford Bay and inland to the Ure Basin, there is a conspicuous Celmisia which may be considered as bridging the gap between C. Monroi and C. coriacea. In consequence it has been referred to, now as the one, now as the other, of these two species. Normally the young leaves are devoid of tomentum on the upper surface, but rapidly acquire a silvery pellicle such as is usual in C. coriacea either over the whole or
portion of this surface. Plants from Kekerangu growing on a heavy clay-soil in Mr. J. Scott Thomson's garden at Dunedin in shady, moist conditions, when seen by me in May, 1933, had lost all trace of tomentum on the upper leaf-surface, and in consequence were so altered in appearance that I failed to recognise the Kekerangu plant with which I was so familiar in Marlborough. On the other hand, all plants grown by me in Blenheim developed pure white leaves in winter. In summer they displayed as much green as white. On the marl cliffs of Clifford Bay flowering specimens sometimes have leaves only 5–6 inches long, while in Woodside Gorge shade-ephamones may have leaves over 2 feet long and proportionately wide. It is evident that the development of tomentum on the top leaf-surface is proportional to the xerophytic conditions of the habitat.


In a separate paper not yet published I have restricted this species to the glabrous plants described by Hooker from Tarndale, and have referred the tomentose Dun Mountain plants to *C. Allanii.* The lectotype at Kew appears to represent a shade-ephamone, which I have been able to match with plants gathered by me on Mount Schiza. These shade plants have flat, membranous leaves which, unless the drying process is very rapid, dry to a black-brown. The normal form, however, has thicker leaves with recurved margins and a somewhat rugose lower surface, and on drying retains the green colour. I had long known each of these two forms before I realized they were epharmones, such as garden culture proved them to be. Subsequent search at Mount Schiza confirmed our conclusions, for the papery-leaved plants were found only in very damp, shaded stations, or growing up to the light through a scrub of *Podocarpus nivalis, Phyllocladus alpina, Hebe rupicola, Aristotelia fruticosa,* etc. Some of these plants had developed a semi-lianoid habit with stems up to 3 feet in length.

5. *Celmisia graminifolia.*

Near the top of a low saddle between Okaramio and the left branch of the Waikakaho Valley, at a height of 1000 ft., this species occupies a small area, part of which is covered with marginal forest-scrub and part of which is open ground covered till recent years with "fern" which had been burnt off. The plants growing on each portion bore no superficial resemblance one to the other. In the open, each plant had wide, nearly oblong leaves 3–4 inches long and of a dark bronze colour when seen in the month of June. On the other hand, the plants growing in the open scrub had grass-like leaves up to 12 inches long, green in colour, and under ½ inch in breadth. Such plants had a length-to-breadth ratio four times that of plants growing in the open. Both forms flower freely. In cultivation these plants show no convergence towards other members of the "*longifolia*" group. I have not grown them from seed, but all other available evidence points to the belief that *C. graminifolia* is a very distinct species.

* Provisional determination.
1. *Celmisia lateralis* var. *villosa*.

This plant has not previously been noted in Marlborough. Its most easterly previous record was Mount Murchison in the Buller Valley, though Dr. H. H. Allan in a letter to the writer reports having collected specimens, now in the herbarium of the Plant Research Station, from the St. Arnaud Mountains in the same locality as subsequently noted by myself. More recently I found it growing in abundance in subalpine meadow at an altitude of between 5000 and 6000 ft, on Mount Schiza, near the source of the Waihopai River, and 20 miles due east of the St. Arnauds. With it were *C. sessiliflora* and *C. incana* var. *nivalis*, two other plants confined to stations where snow lies long each year.

2. *Celmisia discolor*.

The type form of *C. discolor* has previously been recorded from both the St. Arnauds and the Wairau Mountains. It is quite a common plant on the Bounds and Raglans as well and on the mountains near Tarndale, in which localities it grows in company with *C. Traversii* and *C. incana* var. *nivalis* in a compact type of fellfield akin to herbfield. It is just possible that a form on the Raglans may prove to be a distinct jordanon.

3. *Celmisia intermedia*.

This has not been seen save on the St. Arnauds and does not strictly belong to Marlborough. Some botanists would doubtless reduce Petrie’s species (1913, p. 267) to the status of a variety of *C. incana*, which I consider erroneous, or of *C. discolor*, which I regard as inadvisable, as both are diverging compound species with numerous component jordanons.

4. *Celmisia Sinclairii*.

As already mentioned, this plant has only recently been rediscovered after a lapse of over 80 years. In its restricted sense (the tomentose form being provisionally referred to *C. Allanii*) there are apparently no specimens in any collection of plants in New Zealand, living or dried, which can be referred to this species. The typical form was discovered by me on Mount Schiza and subsequently on Mounts Pinnacle, Bounds, St. Arnaud, Patriarch, Richmond, and Fishtail, usually as a member of subalpine herbfield or damp fellfield, or more commonly in peaty soil overlying rock. The usual form of this species bears a striking superficial resemblance to *C. prorepens* of Otago.

5. *Celmisia incana* var. *nivalis*.

This is a very common member of subalpine fellfield, rock-faces, and meadow, and may readily be distinguished from the typical *C. incana* by its dense, lax, lanate tomentum clothing both leaf-surfases, the absence of obvious leaf-corrugations, and its conspicuously reflexed involucral bracts. It ranges from the Seaward Kaikouras to the Wairau Mountains and the Raglans, and south into the Canterbury Province, and quite commonly occurs epiphytically
on *Haastia pulvinaris*. In every habitat there is considerable variation in the dimensions of the leaves of neighbouring plants; yet the plants of any one area may be described as having longer, shorter, broader, or narrower leaves than those of some other area, and in consequence might be regarded as constituting distinct jordanons. Nevertheless, it is possible to select individuals from each quite indistinguishable as hand-specimens. This would seem to support the view that the species of the systematist develop from geographically segregated portions of a primary hybrid swarm and its derivatives.

Furthermore, careful search amongst the individual plants of *C. Allanii* var. *canescens* growing on the St. Arnaud Mountains enabled me to isolate individuals indistinguishable from selected individuals of *C. incana* var. *nivalis* in the fresh or growing condition. When dried, however, they were readily separable, for the tomentum of the former plant on the upper leaf-surface turns brown and adheres to the epidermis.


*Celmsia Allanii* is a new species created for the reception of the plant excluded by me from Hooker’s conception of *Celmsia Sinclairii*, which he based on specimens of two distinct species obtained from two widely separated localities. I have selected as the type a plant from Mount Trovatore which Dr. H. H. Allan, who has examined the Kew material, considers identical with that gathered on the Dun Mountain and forming portion of the type material on which Hooker founded his *C. Sinclairii*. Var. *canescens* differs from the typical form in its whiter tomentum and more tufted habit as well as in its rather shorter leaves with very evident midrib. When the leaf is dried the upper surface turns brown as though the tomentum had mysteriously disappeared. On the lower side the tomentum forms a snow-white, woolly felt save on the rather conspicuous midrib. In this variety, as in *C. incana* var. *nivalis*, considerable diversity of form and dimensions is observable between the various units of the jordanon, comparable with what one might anticipate in the progeny of a cross between individuals of two closely related jordanons; in other words, if this be regarded as a valid jordanon, the range of divergence from the mean is particularly wide. If such be the correct interpretation of the evidence, it seems clear that the original parental forms have now been absorbed in subsequent crossing. Further, since no two members of a hybrid swarm are identical, it follows that the progeny of isolated portions of such a swarm cannot give rise to identical, but only to similar jordanons. The field evidence fully supports this interpretation of the origin not only of this variety, but of every other species and variety of *Celmsia* we have investigated. Var. *canescens* is known to the writer only from the St. Arnaud Mountains, the Red Hills, and the southern end of the Wairau Mountains.

7. *Celmsia Cockayniana*.

The only plants of this species gathered hitherto seem to have been two or three specimens secured by the late Dr. L. Cockayne in 1892 from a rocky ledge near the summit of Mount Fyffe, and
now preserved in the Dominion Museum; though there is in the
Canterbury Museum a leaf bearing the label *C. Sinclairii* (?) which
clearly belongs to this very distinct species, and which was gathered
on the Camden Range by Prof. A. Wall. Strangely enough, the
species is quite common and widely distributed in Marlborough,
growing as it does on both the Seaward and Inland Kaikouras and
parallel ranges to the west, as far as Mount B.J. on the ridge
separating the Waihopai River from the Avon River. The species
is endemic to Marlborough and, indeed, to the North-eastern Botanical
District, but for a slight overlap into the North-western at Mount
Schiza, and occurs always on rock at elevations of from 4000 to
5000ft. As this has hitherto been regarded as a very rare plant,
I give the list of habitats where I have so far collected it, viz.,
Mounts B.J., Bounds, Pinnacles, Schiza, Camden, Malvern, Gladstone,
Tapuaenuku, Kaitarau, Whakari, Fyffe, and Kahutara Saddle where
it is abundant.

8. *Celmisia hieracifolia.*

*Celmisia hieracifolia* var. *oblonga.*

This abundant species is the analogue in the Sounds-Nelson
portion of Marlborough of *C. Cockayniana* in the North-eastern
District. On Mount Dobson it grows in soil pockets on rock faces
as low as 2000ft., but in general it is commonest between 4000 and
5000ft. altitude. I have not seen it south of Mount Patriarch or
east of the Wairau River. The smaller of the two forms on Mount
Stokes is var. *oblonga* (T. Kirk, 1894, p. 329).


This handsome species is met with in Marlborough only in the
North-western District. It is quite common on the Bounds, the
Raglans, and the St. Arnauds, though on the last-named mountains
I have not seen it at the northern end. It is a plant of subalpine
meadows and of soil-coated rocks at elevations exceeding 3500ft. in
areas of high rainfall, and is seen to best advantage in stations not
exposed to bright sunshine.

10. *Celmisia cordatifolia.*

*Celmisia cordatifolia* var. *similis.*

*Celmisia cordatifolia* var. *Brocketti.*

*Celmisia cordatifolia* was established by J. Buchanan (1878,
pp. 427-8) for a coriaceous-leaved plant from Mount Starveall which
was clothed on the seape and lower leaf-surface with rich ferruginous
tomentum. In Marlborough this same plant is to be found on Mount
Fishtail, Mount Rintoul, and Mount Patriarch, and it formerly grew
on Mount Dappa, though I failed to locate it there two years ago.
Two other very distinct jordanos of this species have also been
discovered, one on Mount Richmond and the other on Mount Bounds.
The former differs from the type mainly in having a thin pellicle
of silvery tomentum in place of the thick, red-brown, felty tomentum
which is its most conspicuous character. The leaf is also thinner
and more pointed, and when dry has strongly recurved margins.
This variety has been distinguished as var. *similis.* Var. *Brocketti*
is a much smaller plant discovered by me on Mount Bounds, and
combines the cordate leaf-form of _C. cordatifolia_ with the characteristic type of tomentum seen on _C. spectabilis_. Several dozen plants, all of similar aspect, were noted in a small area, but no one seems to have met with this variety elsewhere. The location is at an altitude of 5000 ft. on a ridge leading from the top of Mount Bounds to the left bank of the R. Gosling, a tributary of the Waihopai. I have named it in compliment to Mr A. E. Brockett, M.A., B.Com., who has been a constant companion on all my field excursions. All three varieties grow in places kept perpetually moist with percolating water, and all affect stations not directly exposed to the sun.

11. _Celmisia Butlandii._

This plant has been recorded only from Mount Stokes (T. Kirk, 1894, p. 329), but it is quite a common plant on all the higher peaks of the Wairau Mountains (e.g., Mounts Patriarch, Richmond, Fishtail, Royal Knob, Sunday, and Riley). Till recently I had regarded the Wairau Mountains form as being distinct from that on Mount Stokes, but garden culture and further field examination have convinced me of their identity. The provisional name of _C. umbrosa_ used by me (1932, p. 10) in my "Vegetation of Marlborough" should therefore be dropped. This is characteristically a plant of shaded rocks and rock-chimneys at an elevation of between 4000 and 5000 ft.

12. _Celmisia spectabilis._

_Celmisia spectabilis_ var. _angustifolia._

_Celmisia spectabilis_ var. _albomarginata._

_Celmisia spectabilis_ is a common Marlborough plant at elevations of 1000 ft. and over, but on the foothills of the Wairau Mountains it is sometimes common as low as 200 ft. Until two years ago my field notes took no cognizance of the existence of distinct jordanons, but at high levels (4000 to 6000 ft.) in the "North-western" part of Marlborough the var. _albomarginata_ almost or wholly replaces the typical form, and the same thing probably holds for the Sounds-Nelson District also. This differs in having somewhat larger and commonly more pointed leaves with a whitish pellicle on the upper surface margined with a rim of denser furry tomentum forming a conspicuous white border, whereas the typical form is glabrous above. Var. _angustifolia_ is likewise glabrous on the upper leaf-surface, but differs from both these other forms in the smaller and relatively much narrower leaves. This variety is practically restricted to the North-western District, though it overlaps on to Mount Patriarch, the southernmost peak of the Wairau Mountains, in the Sounds-Nelson area. It is a plant of herbfield on the Raglan, St. Arnaud, and Bounds Ranges. In the North-eastern District, only the type form is present unless a stunted plant growing in the Ure Basin proves to be a distinct jordanon; I think, however, that it is more likely to prove an epharmone.

13. _Celmisia viscosa._

Nowhere in the North-eastern District have I observed this species, but on the wetter Wairau Mountains (e.g., Mount Fishtail or Mount Richmond) it forms extensive colonies at 5000 ft. altitude.
On the Raglan Range near the gorge of the Wairau River and on the mountains near the Rainbow River in the North-west District this species is again met with.* That it should be apparently missing from the Seaward Kaikoura Mountains seems surprising. _C. viscosa_ is wholly confined to fellfield or to the veneer of soil overlying flat, alpine rock-surfaces.

14. _Celmisia coriacea._
   _Celmisia coriacea_ var. _lancifolia_.

There are no plants attributable to _C. coriacea_ in the Sounds-Nelson District, while in the North-eastern District it has been observed by me only on the Seaward Kaikoura Range. On the other hand, it occurs commonly throughout the greater part of the North-western District. The plant listed by me as _C. Monroi_ var. _conspicua_ might well have been considered a variety of _C. coriacea_. Var. _lancifolia_, though recorded by Cheeseman (1926, p. 950) from the mountains flanking the Wairau and Clarence Valleys, has so far eluded my notice in Marlborough.

15. _Celmisia Monroi._
   _Celmisia Monroi_ var. _robusta._
   _Celmisia Monroi_ var. _conspicua._

Dr. L. Cockayne (1916, p. 194) has drawn attention to the fact that there is no true type for _C. Monroi_, as Hooker's original description was based on plants from two widely separated localities and belonging to more than one species. By the removal of _C. Boweana_ Petrie (1911, p. 18) from the conception of this species, the Awatere plants from Upton Downs have been left as the virtual type of _C. Monroi_.

The narrow-leaved race referred to by Dr. L. Cockayne (1916, p. 194) is probably identical with that growing on the summit-rocks of Mounts B.J. and Ferny Gair. This I have had under observation for some time, and in my garden a measure of convergence has taken place between this and the typical form; the plants are, however, still amply distinct, and I anticipate that the high-level form may prove to be a good jordanon distinct from the three listed, but I refrain from according it varietal rank. Side by side with these two forms we have grown plants from 4500ft. on the St. Arnauds and Bounds which represent a much more robust and wider-leaved variety. Seedlings from these areas have also been raised and have developed the distinctive characters of the variety when grown side by side with plants from Upton Downs. I have designated this variety var. _robusta_.

_C. Monroi_ var. _conspicua_ comes very close to var. _robusta_, especially in the characters of the leaf, but may readily be distinguished by the large size of the bracts, especially of those at the base of the scape. It is a plant of the lowlands and is restricted to the limestone area between the coast and the mountains forming the northern extension of the Inland Kaikouras from the Clarence River north to Lake Grassmere.

* Also on Mount Tarndale.
16. *Celmisia insignis.*

This very distinct species has not previously been collected. It is closely allied to *C. Monroi,* of which it might be regarded as an exceptionally narrow-leaved variety. Even in large specimens where the leaves reach a length of a foot or more, the width rarely attains to a quarter of an inch, and commonly is only an eighth of an inch. The plant is usually silvery-grey in colour, though in winter it may often be quite white. It ranges from the Awatere on the east to the Wairau on the west, and from the Ned in the north to the Wye in the south. I have it from the Ned, Ward Peak, Omaka Basin, Ferny Gair, Mount Harkness, Mount Blairich, and from the valley of the Gosling in the Waihopai Basin. It is to be found in soil pockets on a rock-face, or growing in clay derived from rotten rock, usually on the bank of a stream. More rarely it occurs as a true chasmophyte. Its altitudinal range is from 1000–4500ft.

17. *Celmisia gracilenta.*

*Celmisia graminifolia.*

*Celmisia alpina.*

*C. gracilenta* was first described from specimens collected near Admiralty Bay in the Marlborough Sounds, where it still grows, but throughout the province it is undoubtedly less common than it was in the days before the introduction of stock, game-animals, and agricultural implements. It shows very little epharmonic variation in its response to the water-content of the soil, plants from wet swampy soils being very similar to those from nearby, open, wind-swept pasture. *C. graminifolia,* as already pointed out, shows considerable variation, but neither in nature nor in cultivation does it show any approach to *C. gracilenta* on the one hand or to *C. alpina* on the other. All our field evidence and all observation of these three plants in cultivation strongly supports the view that each is a valid species. Indeed, *C. alpina,* which is commonest in Marlborough as a plant of fellfield rather than of bog, is another species which has a very constant form in all its Marlborough habitats. Whether the bog plant described in the Manual, with its small leaves of 1–2 inches, and the Marlborough shingle plant of 3–5 inches are in reality identical has not been investigated, but a form on the Dun Mountain just beyond the confines of Marlborough appears to be distinct. *C. alpina* is a plant common on fellfield at an altitude of 5000–6000ft., but is as a rule confined to stations where the ground is nearly level and the shingle is very fine. *C. graminifolia* is common as a swamp plant near the head of the Kahutara Saddle. The form on the Okaramio Saddle may belong to a distinct jordanon.

18. *Celmisia laricifolia.*

This species is present on all the higher mountains of Marlborough at elevations of 5000ft. and over.

19. *Celmisia Maomahoni.*

*Celmisia Maomahoni* var. *Hadfieldii.*

The typical form of this species is apparently restricted to Mount Stokes, the highest point in the Marlborough Sounds, and even there it is far from common. It forms compact, silvery cushions
on the steep rock-faces near the summit, these varying from three
or four inches to eighteen inches in diameter. Such a cushion may
produce from thirty to forty scapes, which add much charm to an
already handsome species. On Mount Fishtail, Mount Rintoul,
Mount Richmond, and on Royal Knob there is a very distinct variety
of this species with narrower and more numerous leaves, more densely
compacted, and occupying similar stations between 4000 and 5000ft.
altitude. This chasmophyte has been named in honour of Mr J. H.
Hadfield, who has not only assisted me greatly in this research, but
has also done more than anyone else to introduce this plant to the
notice of New Zealand botanists. Both the species and the variety
are endemic to the Marlborough portion of the Sounds-Nelson
Botanical District. They are most difficult to establish in the garden,
apparently requiring a shady, moist situation, but they are intoler-
ant of stationary moisture at the roots.

20. *Celmisia sessiliflora*.

This is another species confined to the region above the winter
snowline. In the Sounds-Nelson area I have seen it only on Mount
Richmond, but it is common elsewhere in Marlborough, particularly
on the Seaward Kaikouras. I do not recall it on the Inland Kai-
kouras except at the source of the Hodder River, but this range
has been so incompletely botanized that it may well be present in
quantity. It is abundant on the St. Arnaud Mountains.

21. *Celmisia bellidioidea*.

This species has been observed in Marlborough only on Mount
Schiza, though it occurs also on Mount Tarndale and other mountains
to the south. It is stationed near the base of a wet rock-face at an
altitude of 4500ft.

22. *Celmisia Mackau*.

T. Kirk has reported this plant from Mount Fyffe (1899, p. 287)
near Kaikoura, basing his identifications on leaves only. No one else
has located *C. Mackau* elsewhere than on Banks Peninsula, and I
have so far failed to locate it in Marlborough even after careful
search; but, considering the large area to be investigated and the
roughness of much of the country, it may quite well be present.

**Descriptions of New Species and Varieties.**

1. *Celmisia Allanii* spec. nov.

Suffrutex laxus, perennis; *C. incana* Hook. f. peraffinis sed foliiis
longioribus, tenuioribus, et pauciioribus; in summis caulisibus con-
densatis, circ. 9–12; ramosus ad basem, tegetem laxem formans;
reliquae foliorum demortorum adhaerentes. Folia includens
vaginam ± 10 cm. longa, ± 15 mm. lata. Lamina superne argentoo-
viridis vel cinerascens, molliter pubescens; subtus alba, molliter
lanato tomento vestita; costa media vix evidens; tenuis, elliptico-
spathulata, in petiolum tenuem sensim attenuata, margina integerrima.
Vagina membranae, intus fulgida, dorso et marginibus
superne lanata. Scapi prope summos ramulos inserte, gracillimi,
circ. 25 cm. longi, base tomentosi, supra glabrescentes. Bractae ± 7,
lineares vel lineari-oblongae, subulatae, tomentosae, ad apicem versus
diminuentes. Capitulum circ. 3 cm. diam.; involucri bractae linearis, virides, apice recurvatae. Interiores bracteae pilis sericeis albis vestitae. Pappi setae barbellatae. Achenia sericea.

South Island: Type from Mount Trovatore in Herbarium of Plant Research Station, Palmerston North.

2. Celmisia Allanii Martin var. canescens var. nov.

Herba suffructcosa tegeticulas confertas formans. Folia breviora, crassiora, et rigidiora quam typo, viscosa, obtusa; folia viventia a summis ramorum congregata, supra tomento cinereo in vita, in siccitate evidentem glabra; infra hebeti albo tomento arcte appresso. Costa media distincta, paene glabra vel glabrata. Scapus ± 15 cm. glabrus vel glabratus. Bractae circ. 10, parce tomentosae, linearis, involucr square lineares, glandulosae, recurvae. Capitulum 3-4 cm. diam. Achenium paene glabrum; pappo paulo breviora.

South Island: Type locality—Mount St. Arnaud. Type in Herbarium of Plant Research Station, Palmerston North. St. Arnaud Range, Red Hills, and southern end of the Wairau Mountains.

3. Celmisia cordatifolia var. Brockettii var. nov.


South Island: Type locality—Mount Bounds (Bounds Range), Marlborough. Seen nowhere else. Type in Herbarium of Plant Research Station, Palmerston North.

This variety differs from the type form of the species in its almost glabrous scapes and bracts, in its smaller size, and its very distinct tomentum which exactly matches that of C. spectabilis.

4. Celmisia cordatifolia var. similis var. nov.


South Island: Type locality—Mount Richmond (Wairau Mountains), Marlborough. Type deposited in Herbarium of Plant Research Station, Palmerston North.

5. Celmisia insignis sp. nov.

Herba caespitosa C. Monroi affinis; folia numerosa, stricta, linearia, angustissima, 15-20 cm. longa vaginam includentia, ± 3-5 mm. lata, supra argenteo-tomento, marginibus integerrimis, multo reflexis; costa media carinata. Foliorum bases vaginantes, breves, pilosae laxe albis pilis; scapus planus base, ± 30 cm. longus, crassus, albus tomento lanato. Bractae involucr numerosae, lineares, infra tomentosae, superne scariosae. Capitulum ± 4 cm. diam.
South Island: Type locality—Waihopai Valley. Type in the Herbarium of the Plant Research Station, Palmerston North. Area of distribution between the Wairau River and the Awatere River from the Ned to the Leatham River.


South Island: Type locality—Mount Schiza, Bounds Range. Type in Herbarium of Plant Research Station, Palmerston North. A plant of rock, fellfield, and subalpine meadow at 4000 to 6000ft. altitude. Dillon Cone, Mount Tarndale, Mount Schiza, Mount Bounds, Mount Tapuaenuku, Pinnacle, Raglan Mountains, Wairau Mountains, and mountains in Amuri County to the south of Marlborough.

7. *Celmisia Monroi* Hook. f. var. *robusta* var. nov.

Folia typo multo latiora planioraque, sublanieceolata, 12–20 cm. longa, aliquando 30 cm., 3:5–5 cm. lata.

South Island: Type locality—Mount Schiza. Type deposited in Plant Research Station, Palmerston North. Area of distribution Mount Patriarch, Mount Z., St. Arnaud Mountains, Raglan Mountains, Bounds Range, Tarndale.

The ratio of length to breadth of leaf in this variety varies from $\frac{1}{4}$ to $\frac{3}{4}$ that of the typical form.

8. *Celmisia Monroi* Hook. f. var. *conspicua* var. nov.

Similis *C. robusto* sed bractae longiorae et foliosae.

South Island: Type locality—Kekerangan. Area of distribution between the mouth of the Clarence River and Lake Grassmere and inland to the Ure Basin.

The lower bracts of the flowering scapes are often four inches or more long and afford the best distinguishing mark between this and the previous variety.


Differt typo sublanieceolatis vel oblongis foliis latioribus acutioribusque. Folia nova supra dense tomentosa aureis vel argenteis lanatis pilis; in acetate supra tenui pellicula argentei tomenti vestita; vitta angustata conspicui lanati tomenti circumdata et terminata.

South Island: Type locality—Mount Patriarch (Wairau Mountains). Type in Herbarium of Plant Research Station, Palmerston North. This variety ranges over the St. Arnaud Mountains and the southern end of the Wairau Mountains, also occurring on the Raglan Range.
This is a very distinct variety in which the young leaves are entirely tomentose. The adult leaves are also bordered with a ribbon of thick woolly tomentum, while a thin white pellicle partially covers the upper surface. The under-surface has the type of tomentum characteristic of the species, but the leaf as a whole is commonly somewhat more tapering than the type or var. angustifolia.

10. *Celmisia spectabilis* var. *angustifolia* var. nov.

Differt typo foliis angustioribus tenuioribusque. Folia vaginam includens ± 20 cm. longa; lamina ± 12–15 cm. longa, ± 1–1.5 cm. lata. Scapus aliquanto tenuis.

South Island: Type locality—St. Arnaud Mountains. Type lodged in Herbarium of Plant Research Station, Palmerston North.

This constitutes a well-marked jordanon of a widely distributed species which in Marlborough occurs commonly on the St. Arnaud Mountains, Raglan Mountains, and Bounds. The leaves are proportionately much narrower than in the type, glabrous on the upper surfaces of the leaves, and parallel-sided.

**Summary of Results.**

1. Marlborough has been shown to comprise portions of three botanical districts each with species and varieties of *Celmisia* peculiar to itself.

2. A catalogue of the species and varieties of *Celmisia* indigenous to Marlborough has for the first time been prepared. Of the 33 listed forms 13 have not previously been recorded.

3. One new species and 9 new varieties have been discovered and described.

4. Of the 16 hybrids or hybrid-groups recorded, 15 are new to the New Zealand flora.

5. Both forms of Hooker's *C. Sinclairii* have been re-discovered after the lapse of 80 years and found to be specifically distinct. The lectotype form is not known to exist in any collection of plants in New Zealand living or dried. The excluded form is tentatively referred to my *C. Allanii*, of which a variety is described from Marlborough.

6. *Celmisia Cockayniana*, hitherto known only by the original specimens collected in 1892 on Mount Pyffe by Dr. L. Cockayne, has been shown to be common, and to have a wide distributional range in Marlborough.

7. Notes on the distribution, ecology, and epharmacy of the various species are supplied.

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In conclusion, I desire to record my appreciation of the ever-ready co-operation of Dr. H. H. Allan, M.A., F.I.S., and, in particular, for the use of his notes and drawings of some of the types preserved at Kew. To Messrs J. Hadfield and A. E. Brockett, M.A., B.Com., I owe much as congenial field companions during the seven
years and 200,000 feet of climbing involved in this research. Mr. Hadfield has not only collaborated in the field, but has cultivated almost all the forms dealt with in this paper and given me the fullest access to them at all times. To the Curators of the Museums at Christchurch, Dunedin, Wellington, and Auckland, I am grateful for access to the herbaria attached to these institutions and for other facilities readily granted.

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