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A KEY, SYNOPSIS AND CONCORDANCE FOR *RAOULIA*

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ABSTRACT

A key to the species of *Raoulia* is provided, together with a synopsis of the genus and a concordance between the present treatment and that of Allan (1961).

KEYWORDS: *Raoulia*, key, taxonomy, New Zealand, Compositae, synopsis, concordance.

INTRODUCTION

Raoulia, a genus of Compositae endemic to New Zealand, falls within the subtribe Gnaphaliinae (tribe Inuleae) where it occupies a taxonomic position between *Gnaphalium* and *Helichrysum*, possessing links to both these large and widespread genera as well as to the smaller Australasian genera *Leucogenes* and *Ewartia*.

The most recent published account of *Raoulia* (Allan, 1961, pp.701-712) recognises twenty species in three subgenera and six sections. The taxonomic validity of the genus has long been in doubt (e.g., Hooker 1864, Bentham 1873, Kirk 1899), although the generic identity has been maintained on the basis of the distinctive habit. Although *Raoulia* does not have any single unique character, it is readily recognisable by a combination of gross morphological features. The plants are always low-growing, either forming cushions or creeping and rooting at the nodes and usually forming mats, with differentiation into prostrate long shoots and upright short shoots. Throughout the genus the leaves are small, simple, entire, apetiolate with sheathing bases, and usually imbricate. The capitula are solitary, sessile, terminal and discoid, often with the inner phyllaries forming a conspicuous pseudo-ray. Species of related genera show some of the diagnostic features of *Raoulia*, but never all of them in combination.

Most of the species of *Raoulia* are taxonomically distinct, but because of the overall similarity in general appearance they are not easily identified. This is particularly true of the mat species with tomentose, blunt-tipped leaves, and to a lesser extent also of the pulvinate species. The key provided below should permit accurate identification, but it requires testing and the author would appreciate receiving any criticisms.

KEY

1. Tap-rooted cushion, branches not rooting at nodes (except in old, partially rotted plants), appressed to one another with only the tips visible, leaves ascending..... 2
   Plant usually forming mats, main branches always prostrate and rooting at nodes, leaf angle various 9

2. Leaf with a vertical brush of stiff hairs extending beyond apex 3
   Vertical brush absent or not reaching apex of leaf..... 7

3. Brush of hairs on adaxial side of lamina only (truncate leaf apex thus visible from back) 4
   Brush of hairs on both sides of lamina 5

4. Branchlet diameter usually less than 5 mm, leaf almost rectangular (Stewart Island) ..... GOYENII
   Branchlet diameter usually more than 6 mm, leaf wider at apex than at base (SW of South Island) ..... BUCHANANII

5. Brush of hairs short, exposing extreme tip of lamina clad in appressed grey tomentum; tuft of hairs extending laterally from each side of leaf at base of lamina; corolla not red ..... MAMMILLARIS
   Brush of hairs long, obscuring otherwise glabrous tip of lamina; lateral tufts absent; corolla red 6

6. Leaf apex truncate, inner phyllary tips white ..... RUBRA
   Leaf apex rounded, inner phyllary tips not white ..... EXIMIA

7. Leaf almost glabrous, plant green ..... HAASTII*
   Leaf tomentose, plant greyish-white 8

8. Leaf breadth less than half length; corolla not red (northern half of South Island) ..... BRYOIDES
   Leaf breadth more than half length; corolla red (Central Otago) ..... "SP. L"

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* *R. haastii* is initially a mat-former, but older plants often become cushions through repeated branching of the closely set upright shoots.

9. Leaf arrangement distichous ..... MONROI
Leaf arrangement spiral 10

10. Leaves with glandular hairs (rare alpine plant of inland Marlborough) ..... CINEREA
Leaves without glandular hairs 11

11. Leaves more than 6 mm long ..... GRANDIFLORA
Leaves less than 5 mm long 12

12. Pappus hairs less than 25, broad and flattened, attached in 1 series 13
Pappus hairs more than 40, narrow at base, not flattened, attached in more than 1 series..... 15

13. Inner phyllaries long, pure white; leaf obovate with truncate apex ..... YOUNGII
Inner phyllaries hardly exceeding florets, not white; leaf tapering to narrow apex 14

14. Leaf glabrous, thin ..... SUBULATA
Leaf tomentose, coriaceous ..... HECTORI

15. Inner phyllaries conspicuously white-tipped; leaf glabrous or nearly so on adaxial surface, lamina breadth much less than half length 16
Inner phyllaries not white or else leaf tomentose on adaxial surface and lamina breadth much more than half length 17

16. Inner phyllary apex acute; leaf lamina glabrous except for small tuft of hairs on abaxial surface near apex ..... GLABRA
Inner phyllary apex rounded; abaxial surface of leaf lamina covered in hairs except at margins ..... SUBSERICEA

17. Florets predominantly filiform (female) and more than 15; underside of leaf striped (white with black margins and lower midrib); plant greyish black or greenish black ..... "SP. M"
Forets predominantly tubular (hermaphrodite) or less than 15; underside of leaf not striped black and white, plant not blackish 18

18. Leaf less than 2 mm long, uninervate; florets usually less than 10 19
Leaf more than 2 mm long, trinervate (side veins may be obscure); florets usually more than 10 21

19. Lamina widest at base, adaxial surface glabrous ..... HAASTII
Lamina widest in upper part, adaxial surface tomentose 20

20. Capitulum bright yellow at anthesis; leaf sheath extending halfway up sides of lamina forming thin, colourless wing ..... AUSTRALIS
Capitulum cream at anthesis; leaf sheath barely extending up sides of lamina ..... "AUSTRALIS NORTH"

21. Pappus hairs narrowing from centre to apex; leaf lamina breadth less than half length 22
Pappus hairs broadening from centre to apex; leaf lamina breadth more than half length 23

22. Inner phyllaries dark brown; tomentum extending over margins of leaf lamina ..... "SP. K"
Inner phyllaries light to mid-brown; leaf margins glabrous ..... TENUICAULIS*

23. Plants yellow-green; inner phyllaries white to cream (plants never coastal) 24
Plants greyish-white or occasionally silver-green; inner phyllaries usually brown or yellow, rarely white to cream (if so, plants coastal) 25

24. Pappus tips clavate, leaf lamina shorter than sheath ..... PETRIENSIS
Pappus tips not clavate, leaf lamina at least as long as sheath, usually longer ..... PARKII

25. Inner phyllaries very dark brown ..... APICE-NIGRA AGG.**
Inner phyllaries golden brown or pale yellow, rarely cream to white 26

26. Inner phyllaries golden brown; achenes at least 1 mm long ..... ALBO-SERICEA
Inner phyllaries usually yellow, rarely cream to white; achenes less than 1 mm long ..... HOOKERI AGG.***

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* *R. tenuicaulis* is heterophyllous, with broadly obovate juvenile leaves. Plants with both leaf types were described by Allan (*op. cit.* p. 707) as var. *dimorpha*. The juvenile form somewhat resembles *R. hookeri*, but may be distinguished by the larger, softer leaves. It is very common on periodically flooded areas of riverbeds.

** *R. hookeri* var. *apice-nigra* (Kirk) Allan contains at least two specific entities, *R. apice-nigra* Kirk (2n = 28) from the mountains of inland Marlborough and Nelson and *R. beauverdii* (2n = 56) from dry barren montane grasslands of Central Otago and South Canterbury. Of uncertain status are high-altitude populations in Canterbury and Otago and low-altitude populations on limestone in Canterbury and Marlborough.

*** *R. hookeri* (excluding vars. *apice-nigra* (Kirk) Allan and *albo-sericea* (Colenso) Allan) comprises numerous and diverse populations characterised by grey-white, obovate-oblong leaves folded along the midrib, with the apex truncate, and by capitula which are yellow at anthesis.

(Continued at foot of next page)

Twenty-eight species of *Raoulia* are listed in the key, in comparison to the twenty in Allan (1961). A concordance for the two treatments is given at the end of this paper.

The genus as presently constituted contains two very different and clearly demarcated species groups, as well as a number of species of uncertain affinities. The pulvinate species of subgenus *Psychrophyton (R. eximia, R. mammillaris, R. bryoides, R. goyenii, R. rubra, R. buchananii* & *R. "sp. L")* form a coherent, uniform group, quite separate from *Raoulia* subg. *Raoulia,* which forms a coherent if internally variable entity, provided that *R. cinerea* is removed. The remaining six species *(R. cinerea, R. petriensis* and the non-pulvinate species of subg. *Psychrophyton,* i.e., *R. subulata, R. grandiflora, R. youngii* and *R. hectori),* form a link between the above two groups but sit comfortably with neither. The synopsis below shows the main species groups in terms of general resemblance. It should not, however, be regarded as reflecting phylogenetic relationships.

SYNOPSIS

GENUS *RAOULIA:* Plants either prostrate and rooting at the nodes or forming cushions; leaves small, entire, sheathing, usually imbricate; capitula solitary, sessile, terminal.

SPECIES GROUP I: Pappus hairs fine and numerous (>70), attached in several series; achene hairs short or absent; plants prostrate and rooting at the nodes, usually forming mats and usually lowland to montane.

A. Florets predominantly filiform and more than 15; pappus hairs clavate at tip. *"sp. M"*

B. Florets predominantly filiform and less than 15; pappus hairs narrow and acute at tip. *haastii, tenuicaulis.*

*** (Continued)

It is distinguished from the similar species *R. australis* by its larger dimensions and trinervate leaves. The complex is as yet inadequately understood, but 3 entities may be distinguished: (a) an inland form (2n = 56) of semi-stable riverbed; (b) a variant of (a), var. *laxa* (2n = 56), which is more lax in habit and lacks clear differentiation into long and short shoots; (c) a coastal form (2n = 84) which grows on coarse sand and which tends to have larger, fleshier leaves than the inland form and inner phyllaries which are more frequently cream at the extreme tips. However, morphological features which consistently distinguish these 3 entities have not so far been discovered.

C. Florets predominantly tubular; pappus tips variable but never clavate.

1. Corolla and pollen white, inner phyllaries white. *subsericea, glabra.*

2. Corolla and pollen white, inner phyllaries dark brown. *apice-nigra, beauverdii, monroi, "sp. K".*

3. Pollen yellow, corolla and inner phyllaries usually yellow. *australis, hookeri.*

4. Corolla and pollen cream, inner phyllaries cream, white, golden-brown or rarely yellow. *"australis north", parkii, albo-sericea.*

SPECIES GROUP II: Pappus variable; achene hairs short to long; plants prostrate and rooting at the nodes, forming mats; subalpine to alpine.

A. Achene hairs short; pappus hairs free at base; phyllaries not or hardly exceeding florets; florets more than 25; receptacle conical at least at centre.

1. Pappus hairs about 50, narrow at base; leaf without glandular hairs. *petriensis.*

2. Pappus hairs fewer than 20, broad at base; leaf with glandular hairs. *cinerea.*

B. Achene hairs long; pappus hairs free at base; phyllaries not or hardly exceeding florets; florets fewer than 25; receptacle flat to shallowly rounded. *subulata, hectori.*

C. Achene hairs long; pappus hairs coherent at base; phyllaries greatly exceeding florets, conspicuous, white; florets more than 25; receptacle conical. *grandiflora, youngii.*

SPECIES GROUP III: Pappus hairs coarse and flattened, few (<25), attached in one series; achene hairs very long; plants forming tap-rooted cushions; subalpine to alpine.

A. Brush of stout, rigid hairs projecting well beyond leaf apex, which is otherwise glabrous.

1. Brush on both sides of leaf. *eximia, rubra.*

2. Brush on adaxial side only. *goyenii, buchananii.*

B. Brush of stout rigid hairs not or barely exceeding leaf apex, which is covered by appressed white tomentum. *mammillaris, bryoides, "sp. L".*

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CONCORDANCE FOR *RAOULIA*

ALLAN (1961)	WARD (1982)
Subg. *Raoulia*	
Sect. *Raoulia*	
R. australis Hooker f., *p.p.*	*R. australis* Hooker f.
" , *p.p.*	*R. "australis north"*
R. parkii Buchanan	*R. parkii* Buchanan
R. subsericea Hooker f.	*R. subsericea* Hooker f.
R. glabra Hooker f.	*R. glabra* Hooker f.
Sect. *Eradiatae*	
R. hookeri Allan {var. *hookeri*}	*R. hookeri* Allan var. *hookeri*
var. *apice-nigra* (Kirk) Allan, *p.p.*	*R. apice-nigra* Kirk
" , *p.p.*	*R. beauverdii* Cockayne
var. *albo-sericea* (Colenso) Allan	*R. albo-sericea* Colenso
var. *laxa* Allan	*R. hookeri* var. *laxa* Allan
R. haastii Hooker f.	*R. haastii* Hooker f.
R. tenuicaulis Hooker f. {var. *tenuicaulis*}	*R. tenuicaulis* Hooker f.
var. *dimorpha* Allan	"
var. *pusilla* Kirk	?
R. cinerea Petrie	*R. cinerea* Petrie
R. monroi Hooker f.	*R. monroi* Hooker f.
-	*R. "sp. K"* (undescribed)
-	*R. "sp. M"* (undescribed)
Subg. *Mistura*	
R. petriensis Kirk	*R. petriensis* Kirk
Subg. *Psychrophyton*	
Sect. *Acuminatae*	
R. subulata Hooker f.	*R. subulata* Hooker f.

Sect. *Trinerves*	
R. grandiflora Hooker f.	*R. grandiflora* Hooker f.
R. youngii (Hooker f.) Beauverd	*R. youngii* (Hooker f.) Beauverd
R. hectori Hooker f. {var. *hectori*} var. *mollis* Buchanan	*R. hectori* Hooker f. ?
Sect. *Rotundatae*	
R. eximia Hooker f.	*R. eximia* Hooker f.
R. mammillaris Hooker f.	*R. mammillaris* Hooker f.
R. bryoides Hooker f., *p.p.*	*R. bryoides* Hooker f.
" , *p.p.*	*R. "sp. L"* (undescribed)
Sect. *Truncatae*	
R. goyenii Kirk	*R. goyenii* Kirk
R. rubra Buchanan	*R. rubra* Buchanan
R. buchananii Kirk	*R. buchananii* Kirk