

A FIELD GUIDE TO RAOULIA

Josephine Ward

Raoulia is a genus of the Compositae endemic to New Zealand, closely related to Gnaphalium, Helichrysum, Leucogenes and Ewartia. All species of Raoulia are low-growing plants which usually form mats or cushions. They have very small, entire, sheathing, generally imbricate leaves and solitary, terminal, sessile, discoid capitula.

Identification to family can usually be made even in the absence of flowers, due to the persistence of the remains of the characteristic capitulum inflorescence even after the fruits are shed. Within the Compositae, other low-growing taxa with small imbricate leaves are occasionally confused with Raoulia. A very few species of Celmisia (e.g. C. argentea, C. sessiliflora) have the habit of a mat-forming Raoulia but can be distinguished by the presence of ray florets (cf. phyllaries in Raoulia, see below) and by the usually larger leaves; the mat-forming Gnaphalium mackayi and G. nitidulum differ in having capitula which are stalked, at least in the fruiting stage, and the usually shrubby but occasionally cushion-like Helichrysum selago and H. parvifolium in the greater woodiness and the coriaceous, appressed leaves which are shiny on the back and white-woolly on the front.

Within Raoulia most species are readily identifiable, but diagnostic features are frequently microscopic or floral or both. The key below is designed for use in the field at all times of year. It is based on vegetative parts, persistent floral parts and geographical and ecological distribution. Brief notes on each of the low-altitude species are provided as a check. (Those on high-altitude species will appear in a later issue).

The leaves in Raoulia consist of a lamina and a sheathing base; in the key it is necessary to distinguish between the lamina and the leaf as a whole. The lamina is usually folded along all or part of the midrib, so that it is somewhat v-shaped in cross section; it should be flattened before the apex is examined. Branchlet diameter is taken to include both the stem and the leaves.

The flowers of Raoulia are very small and aggregated into capitula. The capitulum is the characteristic inflorescence of the daisy family and consists of an expanded receptacle bearing tightly packed little flowers (florets) surrounded by a border of bracts which are borne on the edge of the receptacle. These bracts form a cup or involucre and are called involucre bracts or phyllaries. A typical "daisy" capitulum (e.g. Celmisia) contains two kinds of florets. The outer ones have a corolla with a flat tongue-shaped upper portion radiating out beyond the phyllaries and are called ligulate or ray florets; they simulate the petals of a single flower but in this case each "petal" is the corolla of an entire flower. The inner florets have a tubular corolla and together form a central disc; they are called disc florets. (See Journal No 15 p 22).

In Raoulia the capitula are borne singly on the ends of the branchlets, among or just above the uppermost leaves. They are always discoid, with disc florets only, never ray florets. However, many species of Raoulia have inner phyllaries which are radiating and superficially similar to ray florets. Sometimes they are white, but if so they are readily distinguished from the ray floret corolla of e.g. Celmisia by their more dry, papery texture and by the absence of other floral parts (style, achene, pappus) at the base. The inner phyllaries are very useful in identifying Raoulia species since they often persist and retain their colour (except when yellow) after the fruits are shed.

The most recent account of Raoulia (Allan, 1961) recognises 20 species, whereas the key below lists 28. Differences between the two treatments are:

Allan (1961)	Ward (1982)
R. australis Hooker f.	R. australis Hooker f.
	R. "australis north" (undescribed)
R. parkii Buchanan	R. parkii Buchanan
R. subsericea Hooker f.	R. subsericea Hooker f
R. hookeri Allan [var. hookeri]	R. hookeri Allan [var. hookeri]
R. hookeri var apice- nigra (Kirk) Allan	R. hookeri apice-nigra
R. hookeri var albo- sericea (Colenso) Allan	R. beauverdii Cockayne
	R. albo-sericea Colenso
	R. "hookeri coastal" (undescribed)
R. hookeri var laxa Allan	R. hookeri var laxa Allan
R. haastii Hooker f.	R. haastii Hooker f.
R. tenuicaulis Hooker f. [var. tenuicaulis] var pusilla Kirk var dimorpha Allan	R. tenuicaulis Hooker f.
R. cinerea Petrie	R. cinerea Petrie
R. monroi Hooker f.	R. monroi Hooker f.
-	R. sp "K" (undescribed)
-	R. sp "M" (undescribed)
R. petriensis Kirk	R. petriensis Kirk
R. subulata Hooker f.	R. subulata Hooker f.
R. grandiflora Hooker f.	R. grandiflora Hooker f.
R. youngii (Hooker f.) Beaurverd	R. youngii (Hooker f.) Beaurverd
R. hectori Hooker f. [var hectori]	R. hectori Hooker f.
R. hectori var mollis Buchanan	-
R. eximia Hooker f.	R. eximia Hooker f.
R. mammillaris Hooker f.	R. mammillaris Hooker f.

R. bryoides Hooker f.	R. bryoides Hooker f.
	R. sp "L" (undescribed)
R. goyenii Kirk	R. goyenii Kirk
R. rubra Buchanan	R. rubra Buchanan
R. buchananii Kirk	R. buchananii Kirk

The key requires testing in the field. The author would appreciate information on any inadequacies and is willing to check identifications.

KEY

1. Leaves arranged in two rows on stem. MONROI
 Leaves arranged spirally on stem. 2
2. Leaves more than 6 mm long. 3
 Leaves less than 5 mm long. 4
3. Lamina ash-grey with copious, loose tomentum;
 rare high-alpine plant of inland Marlborough. CINEREA
 Lamina glaucous, with silky, appressed tomentum,
 widespread montane to alpine plant. GRANDIFLORA
4. Plant forming a dense cushion with branchlets
 appressed to one another and with only the
 tips visible; leaves ascending. 5
 Plant creeping, usually mat-forming (occasional
 individuals may form cushions), leaf angle various. 12
5. Leaf with a vertical brush of stiff hairs
 extending above apex. 6
 Vertical brush absent or stopping short of apex. 10
6. Brush on front of lamina only (truncate leaf
 apex thus visible from back). 7
 Brush on both sides of lamina. 8
7. 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;
 southwest of South Island. BUCHANANII
8. Brush short, exposing extreme tip of lamina
 clad in appressed grey tomentum; tuft of

- hairs extending laterally from each side
of leaf base of lamina. MAMMILLARIS
- Brush long, obscuring otherwise glabrous
tip of lamina; lateral tomentum absent. 9
9. Leaf apex truncate; Wellington and Nelson. RUBRA
Leaf apex rounded; South Island. EXIMIA
10. Cushion green. HAASTII
Cushion grey. 11
11. Leaf breadth less than half length;
Canterbury, Marlborough and Nelson. BRYOIDES
Leaf breadth more than half length;
Central Otago. sp. "L"
12. Capitula with long, white inner phyllaries
which remain after the fruits are shed. 13
Inner phyllaries not white. 15
13. Leaves greyish-white, obovate, with truncate
apex. YOUNGII
Leaves green, oblong, with subacute to rounded
apex. 14
14. Phyllary apex acute; leaves green-gold with
subacute apex; usually in open habitats. GLABRA
Phyllary apex rounded; leaves green (margins
sometimes brownish) with rounded apex;
usually in grassland. SUBSERICEA
15. Leaves quite glabrous with apex tapering to a
long point, plant of wet, alpine places. SUBULATA
Leaves with some hairs at least on underside,
apex not as above, habitats various. 16
16. Leaves bright green to bronze and very thick;
plant of riverbed. HAASTII
The above 3 characters not present in
combination. 17
17. Underside of leaf striped (white with black
margins and lower midrib); plant greyish
black or greenish black. sp "M"
Underside of leaf not striped black and
white; plant not blackish. 18

18. Lamina length less than 1 mm, not from
 Volcanic Plateau. AUSTRALIS
 Lamina length exceeding 1 mm, or from;
 Volcanic Plateau. 19
19. Lamina tapering to subacute or acute apex,
 soft and rather thin. TENUICAULIS
 Lamina not subacute or acute at apex and if
 tapering then tough and thick with rounded apex. 20.
20. Lamina apparently linear; habit creeping and
 invasive rather than mat-forming (rare species
 known only from Volcanic Plateau and Cass. sp "K"
 Lamina not linear or else mat-forming plant of
 dry, barren ground, South Island. 21
21. Lamina hard and thick, shorter than sheath,
 yellow-green at least below; subalpine to
 alpine rocky ground. 22
 Lamina not hard and thick (may be fleshy or
 have thick covering of hairs), if yellow-green
 then longer than sheath. 23
22. Lamina narrowly oblong to triangular and
 ascending, with uniformly appressed
 tomentum; sheath hidden. HECTORI
 Lamina short and very broad, recurved, with
 white woolly tomentum in groove on upper
 side; sheath apparent. PETRIENSIS
23. Plant yellow-green. PARKII
 Plant greyish-white, occasionally
 silver-green. 24
24. Plant of inland North Island. 25
 Plant of South Island or coastal Wellington. 26
25. Leaf sheath with a single vein; branchlet
 diameter less than 4 mm; leaf length
 less than 2.5 mm. "AUSTRALIS NORTH"
 Leaf sheath with 3 veins; branchlet
 diameter more than 4 mm; leaf length
 more than 2.5 mm. ALBO-SERICEA

26. No clear differentiation into prostrate long shoots and upright short shoots, plants forming lax mat (South Westland). HOOKERI var LAXA*
Clear differentiation into prostrate long shoots and upright short shoots, plant usually forming dense mat. 27
27. Plant coastal, on coarse sand. "HOOKERI COASTAL"
Plant not coastal. 28
28. Plant of riverbed, phyllaries pale yellow or straw-coloured. HOOKERI var. HOOKERI
Plant not of riverbed, phyllaries dark brown. 29
29. Plant subalpine to alpine. APICE-NIGRA
Plant lowland to montane, on dry, barren grassland or limestone. BEAUVERDII

*Juvenile plants of R. tenuicaulis and R. hookeri var hookeri will also key out here. Leaves in both are broadly obovate and larger than those of the adult, rather thin in R. tenuicaulis, rather fleshy in R. hookeri but sometimes indistinguishable. Juvenile plants of R. tenuicaulis are much more common, particularly on unstable riverbed.

NOTES TO ACCOMPANY THE KEY. PART I: LOW ALTITUDE SPECIES.

The following brief notes on distribution, general appearance and floral characters can be used in conjunction with the key as an aid to identification.

GRASSLAND SPECIES

R. australis (scabweed): eastern South Island, in dry grassland and stable riverbed, forming hard, dense, blue-grey or yellow-green mats. Capitula in spring, bright yellow (inner phyllaries and corolla clear yellow, pollen bright yellow).

R. parkii: eastern South Island, in dry grassland, forming yellow-green mats, leaves much larger than R. australis, with which it frequently occurs. Capitula in summer and autumn, cream (inner phyllaries opaque cream-tipped, pollen cream).

R. subsericea: mainly South Island, widespread in grassland, forming green mats, leaf margins sometimes brown. Capitula in summer and autumn, white (inner phyllaries, corolla and pollen white).

R. beauverdii: southern half of South Island in dry, barren grassland often with R. parkii and R. australis, forming low, grey mats. Capitula in summer, white with dark brown margins (inner phyllaries dark brown, corolla and pollen white). Also on limestone.

R. monroi: eastern South Island, in dry grassland, similar to R. beauverdii except in growth habit, which is usually creeping and invasive rather than mat forming, and in leaf arrangement, which is distichous (unique in the genus).

R. albo-sericea: Volcanic Plateau, forming silver-grey mats on open ground in dry grassland. Capitula white to cream with golden-brown margins (inner phyllaries golden-brown, corolla clear white, pollen creamish-white).

R. "australis north": Volcanic Plateau, occurring commonly with R. albo-sericea and similar to it in appearance except smaller in all parts, with inner phyllaries colourless to cream at tips. These two species hybridise extensively and intermediate forms are common.

RIVERBED SPECIES

R. tenuicaulis: Common from Thames southward as a colonising plant on unstable riverbed and other bare, moist places; forming green to silver-grey mats which may become large hummocks if undisturbed. Adult form recognisable by soft, narrow leaf lamina tapering to apparently pointed apex, juvenile form with broadly obovate, blunt-ended leaves. Capitula in early spring, few-flowered, inconspicuous, with straw-coloured to mid-brown inner phyllaries, clear white corolla and white pollen; the anthers, which project above the recurved corolla lobes, are often tinged with pink.

R. haastii: Canterbury and North Otago, on stable riverbed, forming bright green mats which become golden-green in autumn and may form large hummocks if undisturbed; leaf lamina subulate. Capitula in spring, very small, creamish-yellow, inconspicuous (inner phyllaries clear, pale yellow, sometimes with opaque white patches at tip, corolla pale yellow, pollen yellow); distinguished from R. tenuicaulis by the brighter mat colour and much thicker leaves.

R. hookeri: semi-stable to stable riverbed, forming silver-grey to silver-green mats; leaves broad, blunt-ended, folded along midrib. Capitula in summer, yellow (inner phyllaries and corolla clear, pale yellow, pollen yellow); distinguished from R. tenuicaulis by the broad, blunt leaf tips and from R. australis by the larger dimensions and 3-nerved leaf base.

R. glabra: semi-stable to stable riverbed, roadsides and other open places, forming usually rather lax mats; leaves oblong, greenish-gold. Capitula large, white, showy, raised above mat (inner phyllaries, corolla and pollen white); distinguished from R. subsericea by more open habitat, more golden leaves, raised capitula and pointed phyllaries.

R. sp. "K": known only from Cass and a few localities on the Volcanic Plateau; creeping and invasive rather than mat-forming, resembling R. monroi in habit of growth and capitula, R. tenuicaulis in leaf arrangement and appearance.

R. australis (see above under Grassland Species).

COASTAL SPECIES

R. "hookeri coastal": a varied collection of populations allied to R. hookeri and forming silver-grey mats on coarse coastal sand. Two other species found occasionally on beaches are R. monroi and R. australis; the latter forms hybrids with R. "hookeri coastal" on the South Wairarapa coast.