*New Zealand Journal of Botany, 2003, Vol. 41*: 223–231
0028–825X/03/4102–0223 $7.00  

# A new species of *Coprosma* (Rubiaceae) from the South Island, New Zealand

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**Abstract** A new species, *Coprosma fowerakeri*, is described from alpine habitats of the South Island, New Zealand. Previously included within *C. pseudocuneata*, it is distinguished by its low spreading habit; stout, recurved lateral branches that often root on contact with soil; fleshy-coriaceous, almost succulent, dark green to bronze-green leaves; conspicuously denticulate, shortly sheathing interpetiolar stipules; bright orange fruit; tetraploid chromosome number; and preference for alpine habitats. *Coprosma fowerakeri* is an abundant alpine and occasionally subalpine species whose conservation status is rated as "Not Threatened" using the New Zealand Threatened Species Classification System.

**Keywords** Rubiaceae; *Coprosma*; *C. pseudocuneata*; *C. fowerakeri*; new species; taxonomy; conservation; New Zealand

*B02055; published 11 June 2003*
*Received 24 July 2002; accepted 20 March 2003*

## INTRODUCTION

*Coprosma* is a Pacific Ocean-centred genus comprising some 110 species of trees and shrubs (Oliver 1935; Van Balgooy 1966; Van Royen 1983; Gardner 2002; Utteridge 2002). The genus is distributed in temperate and montane-tropical regions from Borneo south-east to Australia, New Zealand, and associated subantarctic islands, and across the Pacific Ocean to Hawai'i and Juan Fernandez Islands. The centre of diversity for the genus lies within New Zealand (Oliver 1935; Heads 1996), where there are c. 50–55 taxa formally recognised (Eagle 1982; Dawson 2000; de Lange & Gardner 2002; de Lange et al. 2002) and at least a further seven entities awaiting formal recognition (cf. Eagle 1982).

One of these entities awaiting formal recognition, seemingly first recognised as distinct by the late Tony Druce (1920–1999), as indicated by his numerous collections in the Allan Herbarium (CHR), and variously known as *Coprosma* aff. *pseudocuneata*, *Coprosma* sp. (a), and *C.* "alpina", has long been recognised as a distinctive unnamed species of alpine areas within the South Island, New Zealand (Wardle 1975; Wilson 1978; Eagle 1982; Wilson 1984; Burrows 1986; Wilson & Galloway 1993; Webb & Simpson 2001). This coprosma has been confused with *C. pseudocuneata* Garn.-Jones et Elder (e.g., Oliver 1935, pl. 8A) from which it differs through its low spreading habit, stout branches, fleshy-coriaceous, almost succulent, dark green to bronze-green leaves, conspicuously denticulate, shortly sheathing interpetiolar stipules, and bright orange fruit. It is normally a plant of alpine, and occasionally subalpine, rocky sites, boulder fields, and talus slope margins, and less often open tussock grassland and shrubland, while *C. pseudocuneata* is a species of montane and subalpine forest and shrubland. However, on occasions both species can be found growing sympatrically. Chromosome numbers are also distinct; *C. pseudocuneata* is hexaploid ($2n = 132$) and the unnamed coprosma is tetraploid ($2n = 88$; Beuzenberg 1983).

Here we name and describe this coprosma at the rank of species. We also discuss its distribution, ecology, and conservation status incorporating information from our field observations, including data collected from the Craigieburn Range and Arthur's Pass National Park specifically for this paper, and from the published literature.

## TAXONOMY

***Coprosma*** J.R.Forst. et G.Forst., *Char.gen.pl.*, 137, t.69 (1775) (*fide* Stafleu & Cowan (1976), see also Greuter et al. (1993))

Lectotype: *C. foetidissima* J.R.Forst. et G.Forst. (*fide* Oliver, *Bernice P. Bishop Mus. Bull. 132*, 27, 1935) (see also Heads 1996; Webb 1996).

***Coprosma fowerakeri*** D.A.Norton et de Lange, sp. nov.

DIAGNOSIS: A *Coprosma pseudocuneata* Garn.-Jones et Elder quae silvas et locos frutectosos incolit, differt habitu minore decumbenti longiserpenti, ramis lateralibus numerosis crassis recurvatis, brachyblastis numerosis brevibus crassis perfoliosis, foliis involutes coriaceis atrovirentibus vel aereo-virentibus, stipulis breviter vaginantibus conspicue denticulatis, numero chromosomatum tetraploideo; et praeoptat incolere locos alpinos saxosos vel apertos petrososque etiam scritharum margines.

Differs from the forest and shrubland dwelling *Coprosma pseudocuneata* Garn.-Jones et Elder by the smaller, decumbent, long-trailing growth form, numerous, stout, recurved, lateral branches, numerous short, stout very leafy brachyblasts, coriaceous dark green or bronze-green involute leaves, shortly sheathing conspicuously denticulate stipules, tetraploid chromosome number, and preference for alpine rocky sites, boulder fields, and talus slope margins.

HOLOTYPUS: New Zealand: South Island, Craigieburn Ecological District, Craigieburn Range, Craigieburn Forest Park, end of ridge running southeast from Hamilton Peak, 43°08′S, 171°43′E, *D. A. Norton & P. J. de Lange 5411*, 2 May 2002, AK 256490 (female specimen in fruit); isotypi: BM, CANB, CANU, CHR, HO, NSW, MEL, P, WELT (Fig. 1).

DESCRIPTION: Decumbent, prostrate, to semi-erect, evergreen, dioecious shrub up to 0.60 m tall, with numerous, spreading, long-trailing branches up to 1(–2) m long and 15 mm diam.; these frequently rooting on contact with soil. Main stems 2–5(–8), either semi-erect or decumbent, if the latter then wide spreading; lateral branches decussate, numerous, stout, arising at angles of 45–90°, markedly recurved, rarely straight. Mature outer bark grey to dark silver-grey, variously streaked with fine, wavy black striations, at first smooth, becoming fissured and longitudinally cracked with age, persistent or shedding in small, irregular flakes; inner bark dark green when exposed. Juvenile shoots stout, at first 4-angled, becoming terete with age, initially dull yellow-green heavily streaked purple-black, maturing grey-brown to grey, finely fissured and/or longitudinally cracked; evenly covered in short, erect to antrorse, eglandular, white hairs. Brachyblasts numerous and very leafy, arising in tightly but evenly spaced pairs along stem, leafy, internodes 0.1–0.2 mm, scarcely visible, being ± obscured by leaves and/or stipules. Leaves glabrous, opposite, densely clustered on short shoots; petioles 0.2–1 mm, stout, lamina 5–7(–10) × 1–3(–5) mm, markedly involute, oblanceolate to elliptic, fleshy-coriaceous to almost succulent, glabrous, margins entire, smooth, apex acute to subacute, base cuneate to attenuate, dark green to bronze-green, sometimes yellow-green; domatia absent; midrib and lateral veins not or hardly apparent on either surface. Stipules interpetiolar 0.3–1 mm long, shortly sheathing, chartaceous, glabrous except for distal portion which is densely ciliate; margin of apex entire or bifid; hairs of distal portion somewhat flexuous, at first pale yellow fading to white; associated glandular denticles 2–6, minute, evenly spaced, black, deciduous. Flowers axillary, located in axils of uppermost leaves of previous season's growth flush, solitary or paired. Male flowers larger than female flowers. Pedicels 0.15–0.2 mm long, sparsely hairy, maroon, spotted yellow-green, each with a basal, tubular, connate bracteole; bracteoles c. 0.5–0.6 mm long, lobes obovate-oblong, dark green, glabrous. Calyx reduced, pale green, often with pale gland between lobes; lobes 4, obovate-oblong, basal portion green fading to pale green in distal third; margins ± glabrous, rarely eglandular ciliate near the apex. Corolla 5–6 mm long; tube 1–1.5 mm long, funnelform; basal portion green, remainder green-yellow, with margins usually pigmented dark-red to purple; lobes 4, opening to ¾ of the length of tube, broadly lanceolate to ovate-acute, 3.5–4 × 1.5–2 mm, recurved, minutely papillose at apex and on inside. Stamens 4. Filaments 5–6 mm long, pale green or green-yellow, finely papillate. Anthers 2.5–3 ×

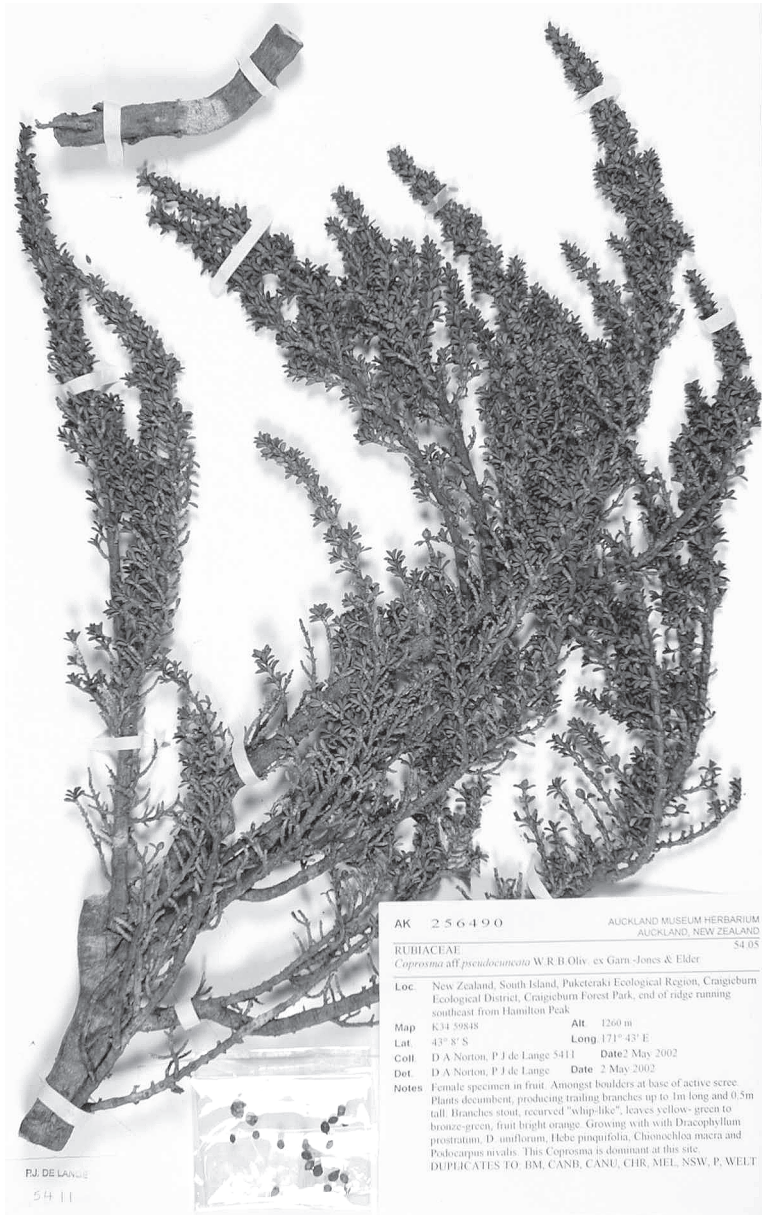


**Fig. 1** Holotype of *Coprosma fowerakeri* (*D. A. Norton & P. J. de Lange 5411*, 2 May 2002, AK 256490).

1–1.5 mm, ovate, elliptic to ± rhomboid, dorsifixed, 2-locular, papillose at apex; pollen yellow. Female flowers with pedicels similar to male flowers. Calyx much reduced, 4-lobed, adnate to ovary. Corolla tube 2–2.5 mm long, narrowly, funnelform, green-yellow with margins pale pink, vinous or purple in distal portion; corolla lobes 4, opening to ¾ of the length of tube, lanceolate-ovate 0.5 × 0.25 mm, recurved, minutely papillose-pubescent at apex and on inside. Ovary ovoid, 2-locular, green. Style branches 2, 6–9 mm long, terete, at first straight then recurving slightly in upper third, twisting markedly on drying, papillose-pubescent; stigmatic hairs 0.1 mm long, pale green to yellow. Drupes globose to subglobose; 4–5(–6) × 3–5(–6) mm when fresh, drying subglobose or ellipsoid; calyx lobes dark-green or black, persistent, arising centrally as a prominent 0.5–1 mm stub; epidermis usually bright orange, occasionally red or yellow, flesh orange. Pyrenes (1–)2, unequal, when two then the larger

(2.5)–3–(4.5) × (1.8–)2.0(–2.8) mm, ovate-elliptic to oblong-elliptic; plano-convex, roughened on the inner face; operculum usually indistinct, c. ⅓ of pyrene length. FL Dec–Mar; FR Dec–May.

REPRESENTATIVE SPECIMENS: NEW ZEALAND: SOUTH ISLAND: NELSON: Head of Cobb Valley, *A. P. Druce*, Feb 1977, CHR 310398 (female flowers and fruit); Lake Sylvester, *D. A. Norton 1742*, 10 Dec 1994, CANU 37081; Lake Aorere, *A. P. Druce*, Jan 1977, CHR 311621 (female flowers); Mt Arthur, *E. M. Heine*, 30 Dec 1933, WELT 48972 (fruit); Mt Brilliant, *A. P. Druce*, May 1980, CHR 363462. MARLBOROUGH: Mt Richmond, *A. P. Druce*, Feb 1980, CHR 358366 (male flowers); Mt Bounds, *A. P. Druce*, May 1976, CHR 282647 (fruit); Wairau Gorge, *T. F. Cheeseman*, WELT 49049 (male flowers); Upper Hodder Valley, *A. P. Druce*, Feb 1981, CHR 366109; Kahutara Saddle, *W. Martin*, WELT 64980; Bert's Stream, *E. K. Cameron 10850*, 7 Jan 2002, AK 256488 (fruit). WESTLAND: Victoria Range, East of Mt Pinnacle, *N. C. Simpson*, May 1978, CHR 323518 (fruit); Cone Creek Tops, Haupiri River, *D. A. Norton*, 22 Oct 1995, CANU 37413; Copland Range, ridge south of Waka Mara, *P. Wardle & I. R. Fryer*, 1 Mar 1969, CHR 185794; Landsborough Valley, *D. A. Norton*, 10 Feb 1982, CANU 27831; South Westland, Red Hills, *J. Ogden*, 3 Jan 1970, CHR 218211 (female flowers). CANTERBURY: Ada Pass, *A. P. Druce*, Jan 1979, CHR 326042 (fruit); Amuri Ski Field, *N. O'Brien*, 14 Dec 1986, CHR 465374 (male flowers); Hurunui River, Macs Knob, *B. H. MacMillan 73/183 & L. Stemmer*, 30 Jan 1973, CHR 257230 (female flowers); Mt Cook, Sebastopol, *H. E. Connor*, Feb 1958, CHR 108229; Little Mt Peel, *B. P. J. Molloy*, 6 Oct 1977, CHR 313430 (fruit); Hunter Range, Upper Pareora River, *B. H. MacMillan 73/398 & A. E. Woodhouse*, 4 Apr 1973, CHR 247006. OTAGO: Makarora River, *H. Talbot*, 9 Jan 1963, CHR 300728 (female flowers); Routeburn Valley, Emily Pass, *A. F. Mark & M. L. Burke*, 10 Dec 1967, OTA 20932 (fruit); Harris Mountains, Treble Cone, *A. P. Druce*, Mar 1985, CHR 395208 (fruit); Hawkdun Range, Blue Duck Creek, *C. C. Ogle 1215*, 14 Mar 1985, CHR 418238; The Remarkables, Wye Valley, *A. P. Druce*, Mar 1985, CHR 394398 (fruit). SOUTHLAND: Eyre Mountains, Upper Mataura, *C. R. V. Prickett*, Feb 1962, CHR 325306; Headwaters, Pomahaka, *K. J. M. Dickinson*, 16 Jan 1986, CHR 431430 (fruit); Homer Cirque, *W. R. B. Oliver*, 26 Dec 1944, WELT 49017 (fruit); Adams Burn, *W. R. Philipson*, 29 Jan 1953, CANU 35943 (male flowers); [Head of] Takahe Valley, *W. R. B. Oliver*, 18 Feb 1952, WELT 56085; Takitimu Mountains, Excelsior Peak, *M. Heads*, 2 Sep 1985, OTA 46453.

CHROMOSOME NUMBER: $2n = 88$ (Beuzenberg 1983, as *Coprosma* sp. (a) aff. *C. pseudocuneata*; CHR 200665).

ETYMOLOGY: This species is named for Charles Ethelbert Foweraker F.L.S. (1886–1964) lecturer and senior lecturer in botany and founding lecturer in charge of the New Zealand School of Forestry, Canterbury College (Burrows 1982). Foweraker was a keen enthusiast of the South Island indigenous flora and spent much time at the Cass field station teaching and undertaking research on the flora and ecology of this area where it appears that he might have known this plant. In a publication on the plant associations of the Cass area (Cockayne & Foweraker 1916), the species list includes "*Coprosma cuneata* Hook. f. var." (no additional name given for the variety). At that time, the name *C. cuneata* included plants from mainland New Zealand that are now referred to *C. pseudocuneata* and *C. fowerakeri*, and to plants from the subantarctic islands to which the name *C. cuneata* is now restricted. *C. pseudocuneata* sens. str. does not occur in the immediate Cass area (e.g., Burrows & Norton 1982), being restricted to the higher rainfall ranges of Arthur's Pass National Park to the west, but *C. fowerakeri* does (CANU 7582), and it is most likely that this is the plant to which Cockayne & Foweraker (1916) referred.

DISTRIBUTION, HABITATS, AND ASSOCIATED PLANTS: *Coprosma fowerakeri* occurs widely through the South Island mountains from Kahurangi National Park and Richmond Forest Park in the north to Fiordland National Park in the south (Fig. 2). This species has not been recorded from any of the North Island mountain ranges or from Stewart Island, although *C. pseudocuneata* is present in both these areas (Oliver 1935; Wilson 1987). *C. fowerakeri* is common along the main divide, where it can be sympatric with *C. pseudocuneata*, but occurs eastwards as far as the Seaward Kaikouras in Marlborough, Hunters Hills in south Canterbury, and the Blue Mountains in Otago, although it appears to be uncommon on the Central Otago ranges (Fig. 2). *C. fowerakeri* can also be sympatric with *C. pseudocuneata* where the latter species occurs east of the main divide (e.g., Mt Somers; B. P. J. Molloy pers. comm. July 2002), although such occurrences appear to be uncommon.

*Coprosma fowerakeri* can be a common plant in the subalpine and especially alpine zones, at altitudes

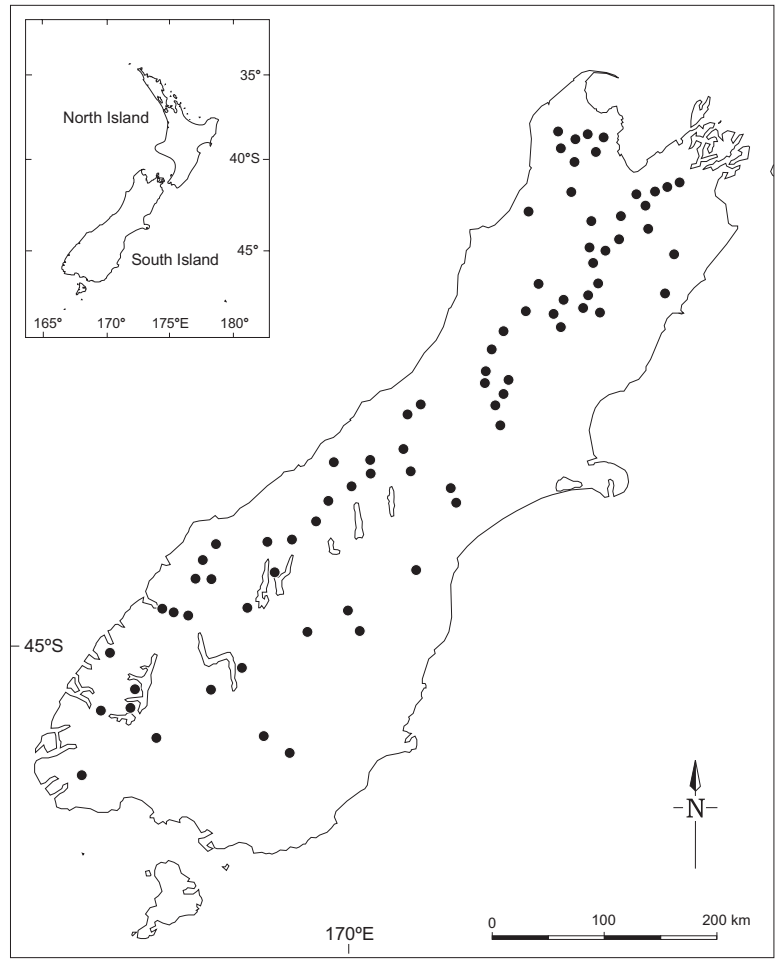


**Fig. 2** Distribution of *Coprosma fowerakeri*.

of c. 1000–1600 m, although it has been recorded as high as c. 2000 m on the Two Thumb Range, Canterbury (CHR 419689), and as low as c. 820 m on the Takitimu Range, Southland (OTA 46453). *C. fowerakeri* is primarily a plant of rocky sites, boulder fields, and talus slope margins, but also occurs in open tussock grasslands and low shrublands, and has extended onto formerly forested soils at some sites. Of 103 herbarium sheets that provided information on habitat, 55.4% recorded this as rocky, 23.3% as grassland (mainly *Chionochloa crassiuscula* and *C. pallens*), 15.5% as shrubland, 3.9% as herbfield/fellfield, and 1.9% as forest.

The optimal habitats for *Coprosma fowerakeri* appear to be rocky sites, boulder fields, and the edges of stable talus slopes (Fig. 3). In these sites, vegetation cover is usually low and *C. fowerakeri* plants grow as short spreading shrubs rarely > 0.3 m tall or as flattened individuals close to the rock surface. Branches can be > 1 m long and will root when they come in contact with the soil. At the edge of a stable talus slope in the Craigieburn Range, Canterbury, *C. fowerakeri* forms large low-growing patches comprising individual plants often > 1 m diameter in association with *Podocarpus nivalis*, *Dracophyllum prostratum*, and *Celmisia lyallii*. At Temple Basin, Arthur's Pass National Park, common associates include *Podocarpus nivalis*, *Dracophyllum pronum*, *Poa colensoi*, *Zotovia colensoi*, *Raoulia grandiflora*, *Anisotome aromatica*, *Celmisia sessiliflora*, *C. discolor*, and *Leucogenes grandiceps* on rocky sites, and *Coprosma cheesemanii*, *Podocarpus nivalis*, *Myrsine nummularia*, and *Melicytus alpinus* sens. lat. in boulder fields. In Mt Cook National Park, common associates include *Podocarpus nivalis*, *Gaultheria*

**Fig. 3** Iron Lake, Kahurangi National Park, where *Coprosma foweraker*i can be found growing on rocky sites, in boulder fields, and in open *Chionochloa* grassland. (Photo: D. A. Norton)

*crassa*, *Dracophyllum kirkii*, *Rytidosperma setifolium*, *Raoulia grandiflora*, *Celmisia angustifolia*, *C. lyallii*, *Leucogenes grandiceps*, and *Geum cockaynei* (Wilson 1976). In the Red Hills, south Westland, common associates include *Dracophyllum menziesii*, *Chionochloa crassiuscula*, and *Celmisia walkeri* (Wardle et al. 1986).

*Coprosma foweraker*i occurs less often in tussock grassland and low shrubland. In tussock grassland it is usually absent from areas with a dense tussock cover, occurring instead in more open grassland with a range of dwarf shrub, herbaceous vascular plant, and cryptogam species (Fig. 4). For example, at Temple Basin *C. foweraker*i occurs in open *Chionochloa pallens* and *C. crassiuscula* grassland in association with *Brachyglottis bidwillii*, *Gaultheria depressa*, *Pentachondra pumila*, *Poa colensoi*, *Celmisia spectabilis*, *C. discolor*, and *Aciphylla similis*. In the Red Hills it occurs in *Chionochloa pallens* grassland with *Hebe hectori*, *Poa colensoi*, *Marsippospermum gracile*, *Celmisia walkeri*, *C. petriei*, *C. verbascifolia*, and *Aciphylla congesta* (Wardle et al. 1986).

*Coprosma foweraker*i is also found in short subalpine shrubland, usually where the canopy is no more than 1 m tall. In the Craigieburn Range, *C. foweraker*i has established into open *Dracophyllum rosmariniifolia* shrubland that has expanded into sites deforested by early European fire. Here it grows with *Hebe pinguifolia*, *Exocarpus bidwillii*, *Dracophyllum acerosum*, *Chionochloa macra*, and *Celmisia spectabilis*. On the Torlesse Range, Canterbury, *C. foweraker*i occurs in similar sites but with *Dracophyllum acerosum* as the dominant associate (B. P. J. Molloy pers. comm. July 2002). In Mt Cook National Park, *Podocarpus nivalis* and *Dracophyllum rosmariniifolia* are usually dominant in shrubland in which *C. foweraker*i occurs, with *Hebe subalpina*, *Gaultheria crassa*, and *Phyllocladus alpinus* also common. Among these a diversity of herbaceous species including *Poa colensoi*, *Anisotome haastii*, *Celmisia semicordata*, *C. petiolata*, and *Anaphalioides bellidioides* occur (Wilson 1976). In these low shrublands, *Coprosma foweraker*i plants are more upright than in other situations.

*Coprosma fowerakeri* occasionally occurs in subalpine forest, although in these sites plants are often very lax, weakly branched, and retain their prostrate growth habit (e.g., in timberline *Nothofagus solandri* forests in the Craigieburn Range). At Temple Basin and in the Craigieburn Range, *C. fowerakeri* was not observed in flushes and other sites with moist substrates. The abundance of *C. fowerakeri* in open habitats, especially rocky sites, boulder fields, and talus slope margins appears to reflect a requirement for open conditions for regeneration. Abundant small and apparently young plants were observed at several sites above Arthur's Pass in rocky areas and depleted *Chionochloa pallens* grassland, but not in shrubland. The habitats in which *C. fowerakeri* occurs are amongst the best drained in the alpine zone and are also sites that lose their snow cover early in spring.

RECOGNITION: *Coprosma fowerakeri* is readily distinguished from *C. pseudocuneata* (Table 1). Significant differences include the tetraploid chromosome number, smaller stature, decumbent/prostrate, long-trailing basal branches which frequently root on contact with soil, and the stouter, recurved "whip-like" lateral branches. The leaves of *C. fowerakeri* are distinctly fleshy-coriaceous, strongly involute, and either dark green or bronze-green, with the shortly sheathing, bluntly triangular interpetiolar stipule apices fringed with hairs and

**Fig. 4** *Coprosma fowerakeri* growing with *Celmisia* species, Arthur's Pass National Park. (Photo: D. A. Norton)

**Table 1** Distinguishing characters of *Coprosma pseudocuneata* and *C. fowerakeri*.

| Character | *C. pseudocuneata* | *C. fowerakeri* |
|---|---|---|
| Habitat | Montane forest and subalpine scrub | Alpine (and subalpine) boulderfield, tussock grassland and associated low shrubland |
| Habit | Erect shrub 1–5 m tall × 1–1.5 m wide | Decumbent or prostrate, rarely semi-erect, shrub 0.02–0.6 m tall × 2 m wide |
| Branches | Within forest habitats, sparingly branched, branches spreading to erect, in subalpine habitats, branches numerous, erect | Branches decumbent, prostrate, long trailing, freely rooting at nodes, lateral branches stout, recurved and "whip-like" |
| Leaves | Somewhat coriaceous, plane to revolute, lamina 10–15(–20) × 3–6 mm, midrib and veins in fresh specimens conspicuous | Fleshy-coriaceous (almost succulent), distinctly involute, lamina 5–7(–10) × 1–3(–5) mm, in fresh specimens veins not evident, midrib not or scarcely evident |
| Stipules | Long-sheathing, apex cleft into 2 triangular portions, each of which is surmounted by a single deciduous denticle, lamina surface and margins covered rest of lamina surface sparsely hairy with copious hairs | Shortly sheathing, apex entire, hairy, with 2–6 deciduous denticles, |
| Fruit colour | Variable, ranging from dark red, orange red, through yellow, yellowish white, orange or pale purple | Bright orange, rarely red or yellow |
| Chromosome number | $2n = 132$ | $2n = 88$ |

2–6 conspicuous black denticles. Some authors (e.g., Wilson & Galloway 1993) have observed that the drupes of *C. fowerakeri* are larger than those of *C. pseudocuneata*, although we have not observed this. With this in mind it is notable that Webb & Simpson (2001) found little difference between the pyrene sizes of these species. However, while the drupe colour of *C. fowerakeri* seems to be more consistently bright orange, with red and yellow forms apparently uncommon, the drupes of *C. pseudocuneata* are more variable, ranging from dark red or orange-red, through yellow, yellowish white, orange, or pale purple. Ecologically, both species can be further distinguished by their habitat preferences: *C. pseudocuneata* is primarily a species of montane forest and subalpine shrubland, while *C. fowerakeri* is usually a species of alpine (and less often subalpine) rocky sites, boulder fields, and talus slope margins, and less commonly of open tussock grassland and associated low shrubland. Nevertheless, the ranges of both species can overlap, and *C. fowerakeri* has been found at the bush line under mountain beech (*Nothofagus solandri*) and sympatric with *C. pseudocuneata*.

ILLUSTRATION: Oliver (1935, pl. 8A, as *C. pseudocuneata*, black and white photograph), Wilson (1978, p. 79, black and white drawing showing details of involute leaves), Eagle (1982, pl. 200, colour painting), Wilson & Galloway (1993, pl. 45, black and white drawing showing stipular detail), Webb & Simpson (2001, pl. 129 t.2, black and white photograph showing dorsal and ventral surfaces or pyrenes).

CONSERVATION STATUS: *Coprosma fowerakeri* is an abundant and widespread species of subalpine and especially alpine boulderfield and low shrubland throughout most South Island mountain ranges, and appears to be under no direct threat. Most of the sites where it occurs are part of the public conservation estate. Given these observations, *C. fowerakeri* is best classified as "Not Threatened" using the New Zealand Threatened Species Classification System (Molloy et al. 2002).

## ACKNOWLEDGMENTS

This paper would not have been possible without the numerous, excellent herbarium specimens collected by the late Tony Druce (1920–1999) and deposited in the Allan Herbarium (CHR), Lincoln. For assistance with and/or comments on a draft manuscript we thank Peter Heenan, Rhys Gardner, Brian Molloy, Ewen Cameron, and Michael Bayly. We thank Elizabeth Edgar who provided the Latin diagnosis and Peter Cleary for field work assistance. We are grateful to the curators and staff of the following herbaria for their assistance with specimens: AK, AKU, CANU, CHR, OTA, WAIK, WELT.

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