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Acaena juvenca and *Acaena emittens* (Rosaceae) – two new species from New Zealand

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Abstract *Acaena juvenca* and *A. emittens* from lowland and montane forest margins and shrubland are described and illustrated. *A. juvenca* is found mainly on the east side of North and South Islands south of 39°S latitude, whereas *A. emittens* is restricted to central North Island. *A. juvenca* and *A. emittens* are compared with *A. anserinifolia* (Forster et G. Forster) J. Armstr., including *A. pusilla* (Bitter) Allan, in a table.

Keywords *Acaena*; Rosaceae; taxonomy; new species; *Acaena juvenca*; *Acaena emittens*; New Zealand flora; forest flora; shrubland flora

INTRODUCTION

The two species of *Acaena* described here grow in the light shade of forest margins and scrub. Both have green leaves without glaucous colouring on the upper surface. They belong to section *Ancistrum* (Forster et G. Forster) DC., with four well developed barbed spines on the fruit and a single carpel. They are easily distinguished from their close relative the common bush piripiri *Acaena anserinifolia* (Forster et G. Forster) J. Armstr. by their more slender habit, by having the three distal leaflets of the leaf almost round, not oblong, and distinctly larger than the lower pairs of leaflets, and by their entire stipules. In a recent treatment of *Acaena* (Macmillan 1988) these two species were mentioned under *A. anserinifolia*. Both may be found growing alongside *A. anserinifolia* and the three species are compared in Table 1.

TAXONOMY

Acaena juvenca B. Macmillan sp. nov. Fig. 1, 2. Suffrutex tenuis; caules c. 1 mm diam., ad 30 cm longi, proni et radicantes. Folia ad 5 cm longa, imparipinnata; foliola (3)–7–11, foliola distalia tria suborbiculata, supra viridia, punctata, subtus glaucescentia, pilis ascendentibus; dentibus penicillatis; stipuli integri vel bifidi. Scapus c. 7 cm longus. Stylus albus. Antherae albae. Fructus c. 2.5 × 1 mm, pilosus. Inter species sectionis *Ancistrum* bene evolutis glochideis fructus spinis carpelloque singulari. Differt a *Acaena anserinifolia* foliorum forma, stipulis integris, pilis ascendentibus, fructibus minoribus.

Holotypus: New Zealand, Otago, Karoro Creek south of Willsher Bay Reserve, 46°25'E lat. 169°46'S long., under thicket of *Coprosma propinqua* marginal to broadleaved–podocarp forest, 100 m. alt., B. H. Macmillan 85/37, 12 Feb. 1985, CHR 316173. Isotypes: AK 176854, WELT 78439, NSW.

Slender suffruticose perennial with red brown or dark brown subterranean stems < 1.5 mm diam. Branches prostrate and < 30 cm long, or erect and < 10 cm long, c. 1 mm diam., light red brown, clad in simple, ascending to erect hairs, epidermis broken with age; internodes < 3 cm long on prostrate stems. Leaves imbricate on short erect shoots, imparipinnate, (1.5)–3.5–5 × (0.7)–1.7 cm; stipules 4–7 mm long, margins, tips, and abaxial face hairy, free portion acuminate, entire or bifid, ± = broad sheath; leaflets (1)–3–5 pairs, the distal leaflet and one or two upper pairs suborbicular in outline, truncate at apex, shallowly cuneate at base, 4–15 × 3–11 mm; upper surface dull, rich green, punctate with raised hair bases, and with distinct veins, lower surface glaucescent, moderately clad in ascending hairs; teeth 8–14, sharply incised, often red brown at least on margins, shortly penicillate, with white or pink hydathodes. Basal leaflet pairs < 1/2 the size of the penultimate pair, or linear and entire, smaller than stipule lobes. Hairs simple, unicellular, < 1.5 mm long, ascending from raised bases, on stipules, rachis, and leaflets. Scapes terminal on short shoots,

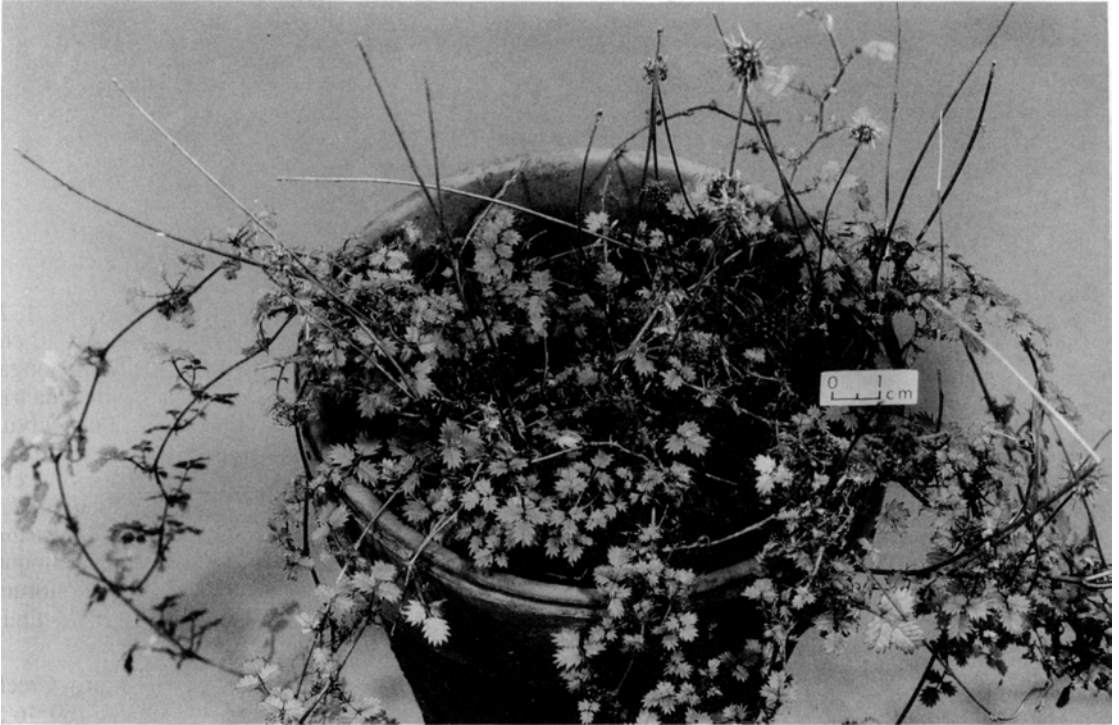


Fig. 1 *Acaena juvenca* from Arowhenua, S. Canterbury. Photo: C. J. Miles

Table 1 Comparison of characters of *Acaena juvenca* and *A. emittens* with *A. anserinifolia*.

	<i>Acaena anserinifolia</i> (including <i>A. pusilla</i>)	<i>Acaena juvenca</i>	<i>Acaena emittens</i>
Leaf	Up to 7.5 cm long, obovate, leaflet pairs gradually reduced in size to the petiole.	Not exceeding 5 cm long, spatulate, leaflet pairs abruptly reduced in size below the 1–2 uppermost.	Not exceeding 5 cm long, spatulate, leaflet pairs abruptly reduced in size below the 2 uppermost.
Leaflet no.	4–6 pairs	(1)–3–5 pairs	3–4 pairs
Distal leaflet shape	Oblong to obovate	Obovate to suborbicular	Obovate to suborbicular
Leaflet teeth	5–7 per side, serrate, penicillate	4–(7) per side, serrate, penicillate	3–5 per side, crenate, polished.
Leaflet hairs	Appressed, sparse or dense on upper surface, predominantly on midrib and main veins of lower surface	Ascending to erect from raised bases, sparse on upper surface, evenly spread over lower surface	Appressed, absent from upper surface, predominantly on midrib and main veins of lower surface
Veins	Indistinct on upper leaflet surface	Distinct on upper leaflet surface	Indistinct on upper leaflet surface
Stipules	3–7-fid, deeply incised	Linear, entire, occasionally bifid	Linear, entire, occasionally bifid
Scape	4–12 cm long	4–15 cm long	4–13 cm long
Capitulum	5–8 mm diam. at flowering 10–20 mm diam. at fruiting	6–8 mm diam. at flowering 10–20 mm diam. at fruiting	4–6 mm diam. at flowering 10–15 mm diam. at fruiting
Fruit	c. 3.0 × 1.2 mm	c. 2.5 × 1.0 mm	c. 2.0 × 1.5 mm
Spines	4–9 mm long	4–6 mm long	4–6 mm long
Chromosome number	2n = 42 (Dawson 1960)	2n=42	2n=42

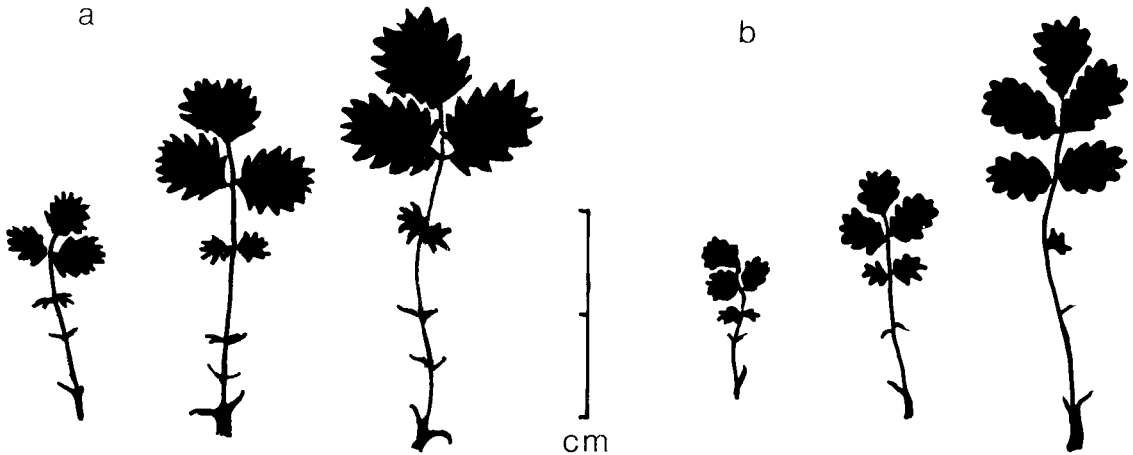


Fig. 2 a, leaves of *Acaena juvenca* from Karoro Creek, Otago, CHR 316173 Holotype; b, leaves of *Acaena emittens* from Tufa, south east of Mt Ruapehu, CHR 210278 Holotype.

(4)–7–15 cm long at flowering, hardly elongating as fruit matures, moderately hairy and roughened by raised hair bases, pale brown. (Frequently a second scape is produced from the axil of an upper leaf in the same season so that the shoot appears forked). Scape bract 0, or foliose, occasionally subtending a single floret. Capitulum 6–8 mm diam. at flowering, 10–15 mm diam. (including spines) at fruiting. Bracteoles on receptacle linear, c. 3 mm long, with hairy margins. Florets c. 45–60, minutely stipitate. Hypanthium c. 1 mm long, enclosing perigynous ovary, clad in appressed hairs and bearing 4 barbed spines which reach above the hypanthium rim. Sepals 4, arising from hypanthium rim, joined at base to form a short tube, 1.2 mm long, ovate, thickened at tip, hairy on abaxial face. Petals 0. Stamens 2; filaments unequal, up to 2.5 mm long; anthers c. 0.4×0.5 mm, white. Style 1, 1.5 mm long, including white, fimbriate stigma 0.7 mm broad and protruding from aperture of hypanthium. Fruit indehiscent with a single achene enclosed in the hypanthium, obconic, c. 2.5×1.5 mm, red brown, moderately hairy, 4-ribbed; spines 1 per rib, slender, 4–6 mm long, pale brown, bearing a single rank of translucent, retrorse barbs at tip.

Chromosome number: $2n = 42$. Beuzenberg and Hair (1983) as *Acaena* sp. (3) aff. *anserinifolia*, voucher CHR 369580 Wairau Valley, Nelson.

Illustration: Wilson (1982) p. 180, fig. 256, as *Acaena* sp. "slender".

Distribution: North Island: southern Kaimanawa Mountains, Rangitikei, Hautapu, and Moawhango

Valleys, northern Ruahine Range, inland Hawke's Bay, Wairarapa district, and Pukerua Bay; South Island: Nelson, Marlborough, east of the main divide in Canterbury, Otago, and Southland; Stewart Island (Fig. 3).

Habitat: Open broadleaved and *Nothofagus* forest, forest margins, scrub, especially that dominated by *Leptospermum scoparium* or *Kunzea ericoides*, shaded sites in grassland, from coast to 1200 m altitude (Fig. 4).

Phenology: Flowering occurs from late November to February, and ripe fruit is dispersed from January.

Representative specimens: NORTH ISLAND: CHR 275067 Ikawetea Stream, N. Ruahine Range, open kanuka scrub, 1400 ft, *A.P. Druce*, Jan. 1975; CHR 363280, AK 176850 Taihape Domain, diverse broadleaved forest edge, 1200 ft, *B.H. Macmillan 81/23* and *A.P. Druce*, 9 Feb. 1981; CHR 159341 Gwavas, near Tikokina, Hawkes Bay, podocarp forest, 900 ft, *A.P. Druce*, May 1966; WELT 29074 Gladstone, Wainui-oru Road, bush; WELT 64364 Pukerua Bay Reserve, Wellington, scrambling among rocks in clearings of kohekohe–mahoe forest, *C.C. Ogle*, 18 Jan. 1974. SOUTH ISLAND: Nelson: CHR 192303 Canaan Road, Pikipikiruna Range, amongst marble blocks, 2600 ft, *A.P. Druce*, Jan. 1969; CHR 311745 Cobb Valley, manuka scrub on hillside, 2500 ft, *A.P. Druce*, Feb. 1977; Marlborough: CHR 249289 Branch River, opposite Silverstream, Wairau Mountains, open forest beside

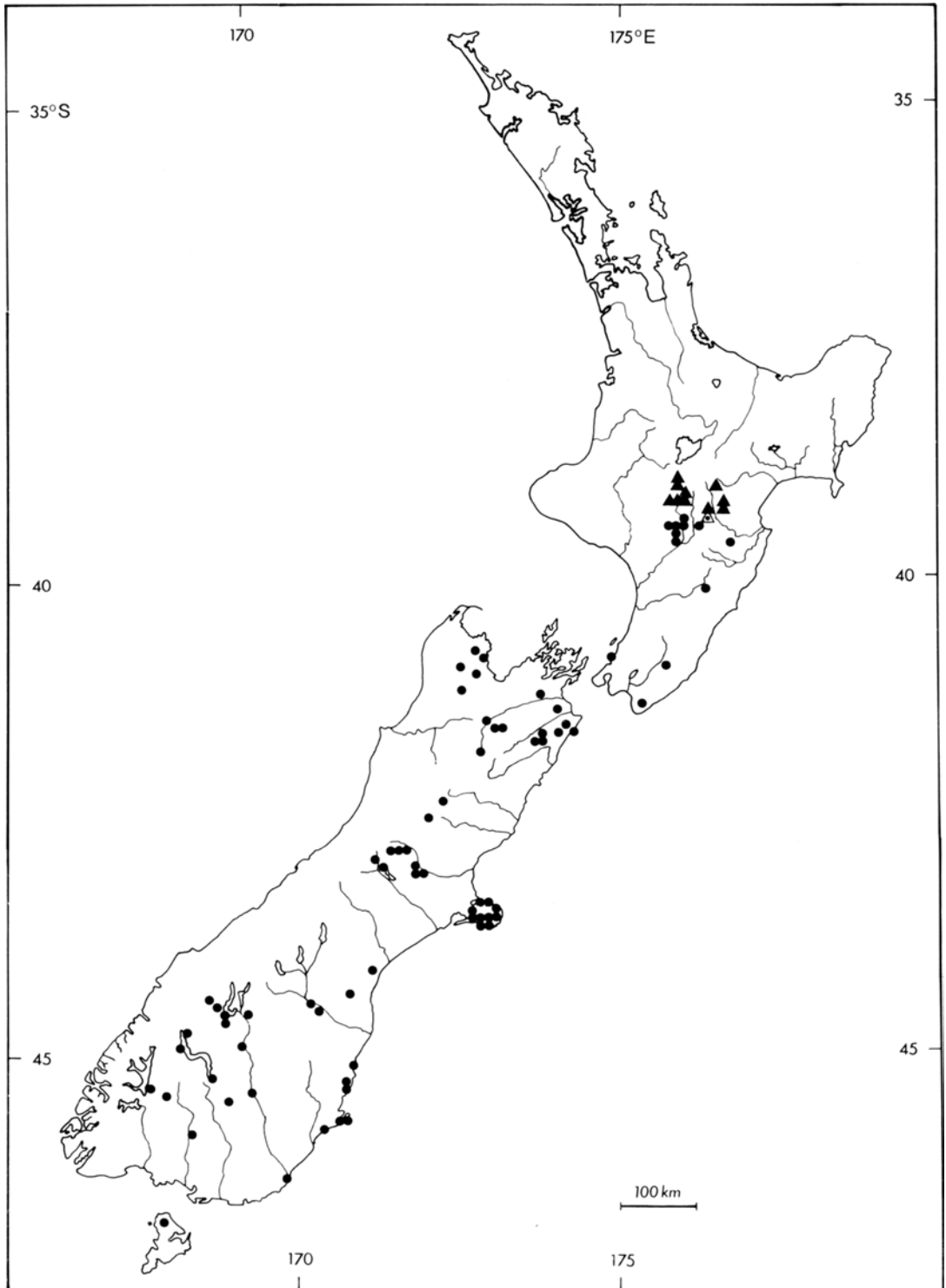


Fig. 3 Distribution of *Acaena juvenca* (circles), and *Acaena emittens* (triangles).



Fig. 4 *Kunzea ericoides* stand on Boyle River at junction with Lewis River, N. Canterbury, 600 m, habitat of *Acaena juvenca*.

Fig. 5 *Acaena anserinifolia* from Riccarton Bush, Christchurch, a, seedling; b, leaf from mature plant.

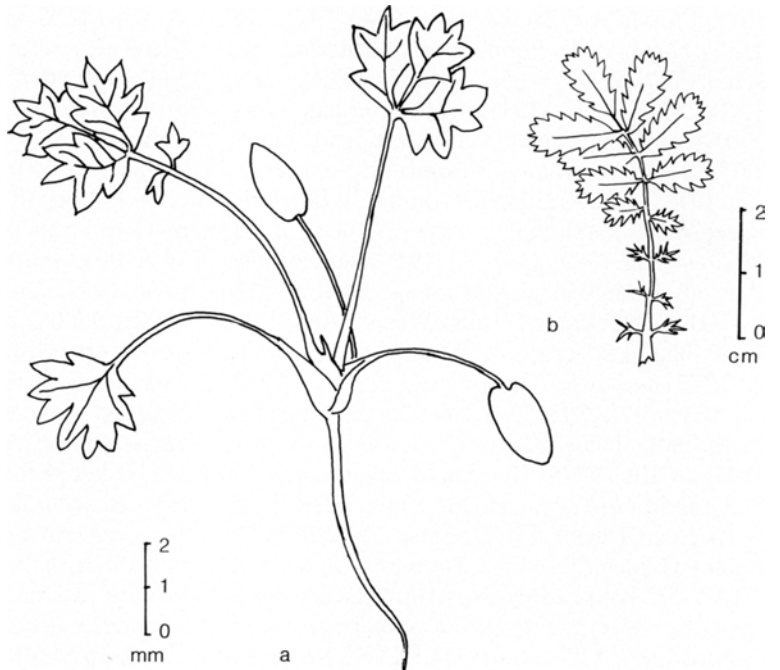




Fig. 6 *Acaena emittens* from Waipakihi River, central North Island. Photo: C. J. Miles

river, 1700 ft, *A.P. Druce*, May 1974; WELTU 13127 Haldon Hills, forming patch under manuka scrub, *W.D. Burke*, 30 Sept. 1979; Canterbury: CHR 257258, AK 176851 Upper Hurunui River, 2 m west of Lake Sumner, shaded bank, under scrub, 1800 ft, *B.H. Macmillan 73/2 and L.R. Stemmer*, 29 Jan. 1973; CHR 388141 Mt Algidus, Wilberforce River, near summit in grassland, c. 4500 ft, *B.P.J. Molloy*, 1 Apr. 1980; CANU 3449 Banks Peninsula, Warren's Bush, Wainui, *R.M. Laing*; CHR 247313, NZFRI 17426 Hunters Hills, Weaner Run, Blue Cliffs Station, under scrub, 1000 ft., *B.H. Macmillan 72/1235 and A.E. Woodhouse*, 13 Dec. 1972. OTAGO: CHR 283653 Trotters Gorge, forest edge in valley bottom, 300 ft, *P.N. Johnson*, 18 Aug. 1977; CHR 107785 Dunstan Mountains, gully of Plot 2 and 3, *H.H. Allan*, 16 Dec. 1947; CHR 79150 Black Head, Dunedin, *G. Simpson*; WELT 28898 Botanic Garden, Dunedin, *J. Buchanan*. Southland: OTA 43685 Waikaia Bush, west Umbrella Ecological District, c. 400 m, *K.J.M. Dickinson and B.D. Rance*, 29 Nov. 1985. CHR 96970, OTA 43992 Near Lake

Te Anau, *G. Simpson*; CHR 320127 Caroline Bush Scenic Reserve, west part, totara-broadleaved forest glade, 1100 ft, *C.D. Meurk*, 14 Feb. 1978.

Acaena juvenca was collected at a few widespread localities on the eastern side of New Zealand by early botanists from the time of J. Buchanan (who came to Dunedin in 1849). It was first investigated by G. Simpson and J. S. Thomson of Dunedin and W. B. Brockie of the Christchurch Botanical Gardens in the 1930s. Specimens at Botany Division (CHR 97001, 97005) pressed 27 December 1941, were grown in pots from plants sent to H. H. Allan by W. B. Brockie. The labels in Allan's hand state "ex. Geo. Simpson" and quote Brockie's comment "sent me as var. *hirsutula* from Dunedin." Simpson & Thomson (1938) described the *Myoporum laetum* coastal forest of the Dunedin district in which they listed *A. hirsulata* (sic) var. among the frequent ground plants. *A. juvenca* is particularly well represented from the vicinity of Dunedin. Johnson (1982) recorded *A. juvenca* (as *Acaena* "916") in 37 of 70 mainly forest and scrub sites studied on Otago Peninsula.

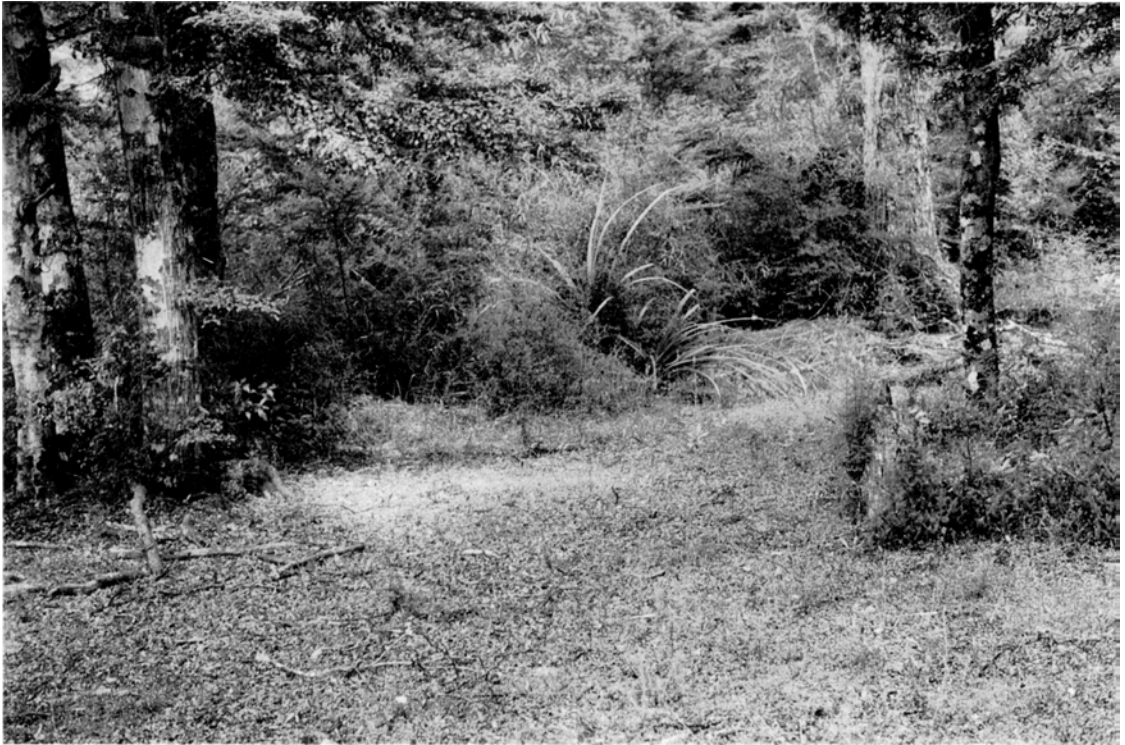


Fig. 7 Glade in *Nothofagus solandri*–*N. fusca* forest at Waipakihi River, central North Island, 950 m, habitat of *Acaena emittens*.

The epithet *juvenca* is given to mark what I believe could have been a neotenic origin for this species. The seedling of *A. anserinifolia*, the widespread species to which *A. juvenca* is closely related, has a simple, orbicular first true leaf which is followed by a trifoliate leaf. The third leaf is imparipinnate with five leaflets, the distal three being more than 2× the basal pair, and with a small entire stipule (Fig. 5). *A. anserinifolia* subsequently produces leaves with 4–6 pairs of leaflets which lack the marked difference in size between the distal and basal leaflets; these leaflets are oblong, with length up to 3× width and have appressed hairs. Thus the distinguishing characters of *A. juvenca* are expressed in the juvenile habit of *A. anserinifolia*. An ancestral form of *A. anserinifolia* could have had an arrested ontogeny which, with the onset of sexual maturity, gave rise to *A. juvenca*.

Variation: Wilson (1982, 1987) described and illustrated as *Acaena* “slender”, a variant of *A. juvenca* from Stewart Island. It was found very locally in the tributary valleys of Freshwater River south of Mt

Anglem. In the herbarium voucher (CHR 389016) many of the leaves are truly trifoliate, lacking basal leaflets, and stem and leaf hairs are sparse and appressed. The foliage is described as bright yellow green which is uncommon in the species. Similar plants were collected in Southland, north of Burwood Bush between Oreti and Mararoa Rivers by P. N. Johnson (CHR 253237). The habitats are damp, shady, sandy creek bank under manuka, and streamside under mountain beech forest.

Acaena emittens B. Macmillan sp. nov. Fig. 2, 6. Suffrutex tenuis; caules c. 0.7 mm diam., ad 50 cm longi; proni et radicantes. Folia ad 5 cm longa, imparipinnata; foliola 7–9, foliola distalia quinque obovata vel suborbiculata, supra viridia, laevia, subtus pallida, sericea, dentibus crenatis et politis; stipuli integri vel befidi. Scapus c. 10 cm longus. Stylus albus. Antherae albae. Fructus c. 2 × 1.5 mm, pilosus. Inter species sectionis *Ancistrum* bene evolutis glochideis fructus spinis carpelloque

singulari. Differt a *A. anserinifolia* foliorum forma, crenis, stipulis integris, fructibus minoribus.

Holotypus: New Zealand, central North Island, near Tufa, south east side of Mt Ruapehu, 39°20'E lat. 175°38'S long., forest margin, c. 1200 m. alt., A.P. Druce, Feb. 1971, CHR 210278.

Slender suffruticose perennial with dark brown subterranean stems < 2 mm diam. Branches prostrate and < 50 cm long, or erect and < 5 cm long, c. 0.7 mm diam., brown, hirsute, epidermis flaking with age; internodes < 3.5 cm long on prostrate stems. Leaves hairy; stipules 2–6 mm long, margins, tips and abaxial face hairy, free portion linear, entire or bifid, ≤ sheath; leaflets 3 or 4 pairs, the distal leaflet and 2 upper pairs obovate to suborbicular in outline, truncate at apex, shallowly cuneate at base, 2–10 × 2–6 mm; upper surface dull green, glabrous, smooth, with secondary venation indistinct; lower surface pale, glaucescent, the veins with appressed hairs; teeth 7–9 with margins thickened and recurved, hydathodes pink. Basal leaflet pairs less than 1/2 the size of the penultimate pair, or linear and smaller than stipule lobes. Hairs simple, unicellular, < 1.5 mm long, on stipules, rachis and leaflets. Scapes terminal on short shoots, 4–13 cm long at flowering, hardly elongating as fruit matures, c. 0.5 mm diam., moderately hairy, pale brown. Scape bract linear or foliose, occasionally subtending a single floret. Capitulum 4–6 mm diam. at flowering, 10–15 mm diam. (including spines) at fruiting. Bracteoles on receptacle linear, c. 3 mm long, with hairy margins. Florets c. 40–50, minutely stipitate. Hypanthium c. 1 mm long, enclosing perigynous ovary, densely hairy, bearing 4 barbed spines which reach above the hypanthium rim. Sepals 4, arising from hypanthium rim, shortly joined at base, c. 1.5 mm long, elliptic, narrowed and thickened at tip, sparsely hairy on abaxial face. Petals 0. Stamens 2; filaments unequal, up to 2 mm long; anthers 0.3 × 0.5 mm, white. Style 1, 1.5 mm long, including white, fimbriate stigma 0.6 mm broad and protruding from aperture of hypanthium. Fruit indehiscent with a single achene enclosed in the hypanthium, obconic, c. 2 × 1.2 mm, brown, moderately hairy, 4-ribbed; spines 1 per rib, slender, 4–6 mm long, pale rose or brown, bearing a single rank of translucent, retrorse barbs at tip.

Chromosome number: 2n = 42. Beuzenberg and Hair (1983) as *Acaena* sp. (1) aff. *anserinifolia*, voucher CHR 369582 Kaweka Lakes, Hawke's Bay.

Distribution: NORTH ISLAND: eastern Tongariro National Park, southern Kaimanawa Mountains, Kaweka Range, Taruarau River, Otupae Range, north-west Ruahine Range (Fig. 3).

Habitat: Open *Nothofagus* forest, scrub especially that dominated by *Leptospermum scoparium*, open disturbed sites, from c. 450 to 1500 m altitude (Fig. 7). Most of the localities lie in the cool, superhumid climatic region (Garnier, 1958) with annual rainfall over 2400 mm. South-eastern outliers are within the 1600 mm isohyet (New Zealand Meteorological Service, 1985).

Phenology: Flowering occurs from December to February, and ripe fruit is dispersed from January.

Representative specimens: CHR 363298, WELT 78440 Kaimanawa Mountains, Waipakihi River, clearing in *Nothofagus solandri* forest, in loose litter, 3100 ft, B.H. Macmillan 81/41 and A.P. Druce, 11 Feb. 1981 (cult. CHR 363085, AK 176852, WELTU 15639); CHR 260063 Kaimanawa Mountains, Moawhango River, east of Tunnel Portal, scrub, 3000 ft, A.P. Druce, Jan. 1974; CHR 394300 Kaweka Range, south east of Te Pukeohiokarua, beech forest on ridge, 4500 ft, A.P. Druce, 2 Jan. 1985; CHR 273984 The Lakes, east foot of Kuripapango Hill, open manuka scrub, 2200 ft, A.P. Druce, Dec. 1974; CHR 371526, NZFRI 17425 Taruarau Hill, west of Taruarau River on Taihape–Napier road, beech forest edge, 2700 ft, B.H. Macmillan 81/49 and A.P. Druce, 13 Feb. 1981; CHR 275069 N. Ruahine Range, Ikawetea Stream, open scrub on river terrace, 1400 ft, A.P. Druce, Jan. 1975.

Acaena emittens was first collected by A.P. Druce in the Waipakihi River valley in April 1946 (CHR 221353) and from 1968 he has documented its distribution with herbarium specimens, and observed plants in cultivation in the Hutt Valley. In an analysis of regional endemism in the North Island (Druce 1984) he listed *A. emittens* (as "makito") among 18 flowering plants endemic to his Region C, between Manawatu Gorge and latitude 39°S excluding Egmont.

The epithet *emittens* refers to the habit of sending out slender stolons through forest litter to form loose patches up to a metre in diameter.

ACKNOWLEDGMENTS

I thank Dr E. Edgar, Dr P. N. Johnson and Mr A. P. Druce for their very helpful comments on the manuscript. Specimens were found in the herbaria of National Museum, Wellington (WELT), Victoria University of Wellington (WELTU), University of Canterbury, Christchurch (CANU), and University of Otago, Dunedin (OTA) and I

thank their keepers for access to the collections. The map was drafted by Sabrina Malcolm. Mr A. P. Druce collected the majority of the specimens of *Acaena emittens*, and of *A. juvenca* from the North Island, Nelson, and Marlborough. He also took me to see *Acaena* habitats in central North Island which was necessary for the progress of the study. Mr H. D. Wilson provided specimens and site records of *A. juvenca* from his recent floristic survey of Banks Peninsula.

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