

***Bazzania avittata* (Lepidoziaceae, Marchantiophyta), a new species from New Zealand**

David Glenny 

Manaaki Whenua, P.O.Box 69-040, Lincoln 7640, New Zealand,

glennyd@landcareresearch.co.nz

Abstract

Bazzania avittata Glenny is described from New Zealand from a single collection. It is similar to *B. nitida* (F.Weber) Grolle in leaf size (662–700 µm long and 578–610 µm wide in *B. avittata* versus 600–900 µm long and 365–580 µm wide in *B. nitida*) but there is no vitta and the dorsal leaf margin is more strongly ampliate. Leaf surfaces are asperulate throughout. The underleaf is not hyaline at the margin, a feature shared with *B. amblyphylla* Meagher of Australia, but that species is vittate.

Keywords

Endemic, lowland, forest, asperulate, *Bazzania nitida*, *Bazzania amblyphylla*, Western Nelson.

Introduction

Bazzania Gray is a large, worldwide genus, now with 13 species known in New Zealand (Allan Herbarium 2025). Of these, five species are now endemic (*B. exempta* J.J.Engel, *B. okaritana* Meagher & Glenny, *B. polita* Glenny, *B. tayloriana* (Mitt.) Kuntze and the new species *B. avittata* Glenny). The other eight are shared with Australia, with *B. nitida* (F.Weber) Grolle also occurring in South America and South Africa (Engel & Glenny 2008) and *B. adnexa* (Lehm. & Lindenb.) Trevis. in the Pacific and east Asia (Thouvenot 2024).

A new species of *Bazzania* was found in a fresh collection made recently on the Heaphy Track in Western Nelson. Further specimens were searched for in *Bazzania nitida* collections at CHR, as the leaves have nearly the same length and width, without success. The plants of *B. avittata* have some similarities to the Australian species *B. amblyphylla* Meagher in size, small teeth on leaves and underleaves and in having no hyaline border on the underleaves. However, *B. amblyphylla* has a distinct vitta.

Methods

Specimens were examined with dissecting and compound microscopes, and photographs were taken through a Leica DM2500 compound microscope. Leaves and underleaves were bleached and then usually stained with methylene blue for better definition of cell walls except where chloroplasts and oil-bodies were being photographed.

Taxonomy

Bazzania avittata Glenny, *sp. nov.*

Type: New Zealand: Western Nelson, Heaphy River, 172.15°E, 40.92°S, 200 m, *Dacrydium cupressinum* forest on hillslope, track margin, cut end of log mainly mixed with *Riccardia lobulata*; *Acrobolbus setulosus*, *Bazzania engelii*, *Geocalyx caledonicus*, *Kurzia hippuroides*, *Lembidium nutans*, *Lepidozia kirkii*, and *Zoopsis argentea* also present, 5 May 2025, D. Glenny 15875b (holotype: CHR 700570).

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Diagnosis: Plants green, ventral intercalary branches with normal leaves predominant; leaf 662–700 μm long, 578–610 μm wide, asymmetrically truncate-ovate, apex with 3 small lobes, the lobes sometimes reduced to angles, not vittate, leaf surfaces asperulate throughout; underleaves narrowly 2-connate, hyaline cells absent, apex and margins sharply toothed; leaves and underleaves not caducous.

Description: Plants semi-prostrate in dense cushions of other bryophytes, 4–5 mm long, mid-yellow green and translucent but not membranous when fresh, leaf surfaces glossy. Shoots 520–600 μm wide. Branches 2–6 per shoot, 50–90% of branches ventral-intercalary with normal-leaves; both microphyllous ventral-intercalary branches and terminal, *Frullania* type branches also present. Stem 230–250 μm diameter. Rhizoids not seen. Leaves alternating dorsally but only slightly offset ventrally, leaves tilted c. 45° out of the plane of the stem and overlapping

each other by about one half. Leaves 650–700 μm long, 578–610 μm wide (length to width ratio 1.1–1.2), asymmetrically truncate-ovate; dorsal leaf attachment reaches 2/3 of dorsal stem width, free dorsal margin completely overlapping the stem, resulting in stem not visible dorsally (Fig 1). Leaves slightly convex dorsally, apex slightly incurved when fresh, the apex slanted-truncate, 45–80° to the basiscopic leaf margin, the basiscopic leaf lobe as much as 2/3 of the distance between leaf base and apex. Three apical lobes small (Fig. 1B, sometimes reduced to angles at the truncate leaf apex, then each composed of 1–3 cells and without a distinct sinus between the lobes (Fig. 1A, C, D). Accessory teeth absent from the margins and apex.

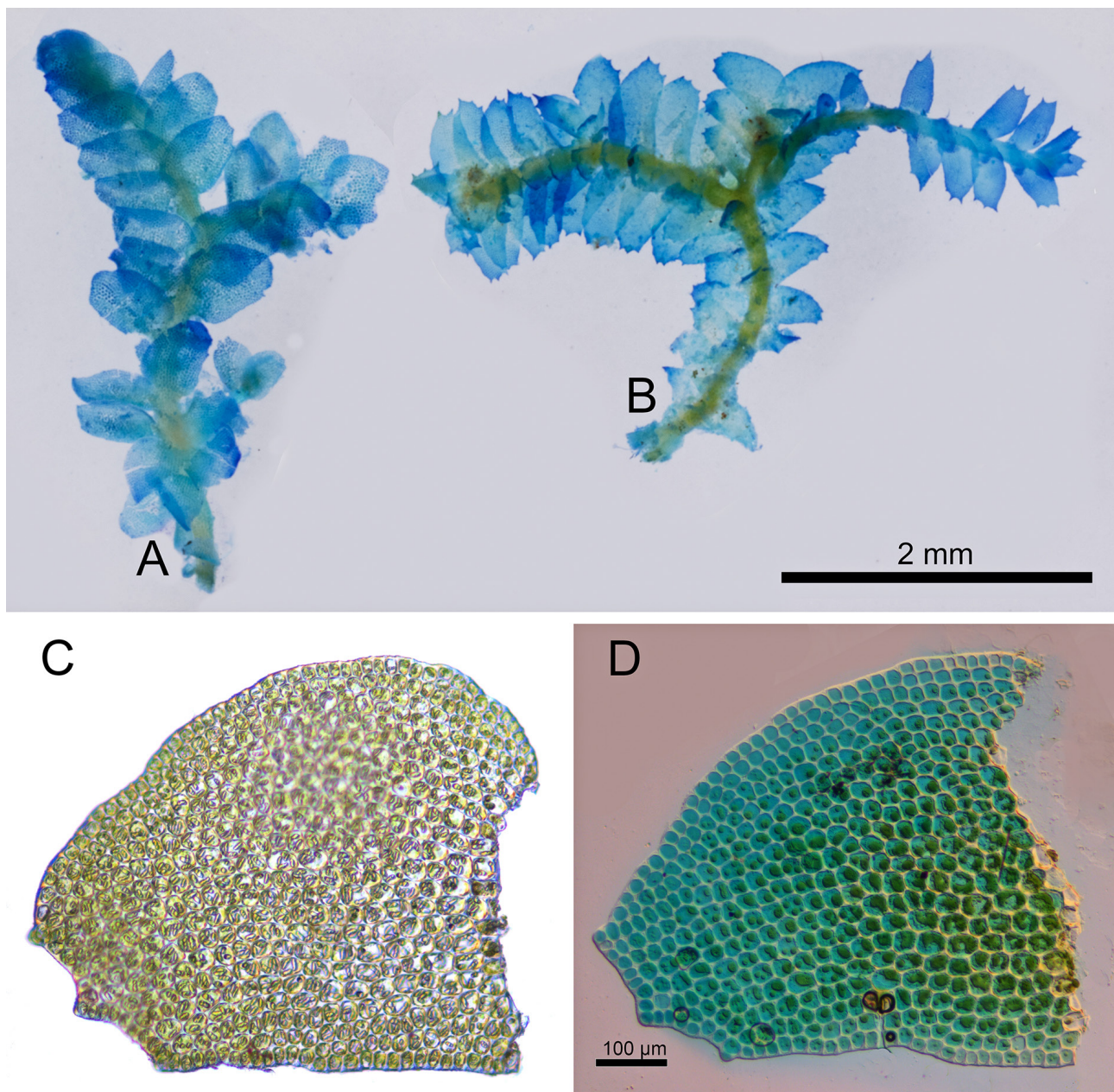


Figure 1. *Bazzania avittata*, whole plants and leaves with weak apical lobes. A, Dorsal view, B, Ventral view, C–D, two leaves showing weak apical teeth, amplexate dorsal margin, and obliquely truncate apex. 100 μm scale bar applies to both leaves. Leaf in D bleached and stained with methylene blue. All photographed from the type (CHR 700570).

Dorsal leaf margin strongly ampliate at the base. Ventral leaf margin straight, not decurrent. Vitta and subvitta absent, ratio of largest to smallest leaf cell size 1.5–2.0:1 (Fig. 1). All leaf cells chlorophyllose. All leaf surfaces asperulate, c. 40 papillae over each cell, most easily seen at the margins (Fig. 2E and F). Cells at midleaf $21\text{--}39 \times 21\text{--}33 \mu\text{m}$, walls $2\text{--}3 \mu\text{m}$ thick (Fig. 2B), trigones moderate in size and straight-sided, not confluent. Cells at leaf base $28\text{--}50 \times 27\text{--}30 \mu\text{m}$, walls $2 \mu\text{m}$ thick, trigones concave, sometimes partly confluent and then up to $9 \mu\text{m}$ thick

(Fig. 2A). Cells at acroscopic margin $20\text{--}25 \times 20\text{--}23 \mu\text{m}$, walls $3 \mu\text{m}$ thick, trigones moderate, with straight sides and often confluent, leaf marginal wall $4 \mu\text{m}$ thick (Fig. 2B–C). Oil-bodies at midleaf 2–4 per cell, colourless, unsegmented (homogeneous) or with 2–3 complete segments, ellipsoidal to sausage-shaped, $9\text{--}20 \times 8\text{--}9 \mu\text{m}$ (Fig. 2D). Oil-bodies at leaf base 3–6 per cell, also ellipsoidal to sausage-shaped, larger, $12\text{--}20 \mu\text{m} \times 8\text{--}10 \mu\text{m}$. Oil-bodies at acroscopic leaf margin 2 per cell, homogeneous, ellipsoidal, $6\text{--}10 \times 4\text{--}5 \mu\text{m}$.

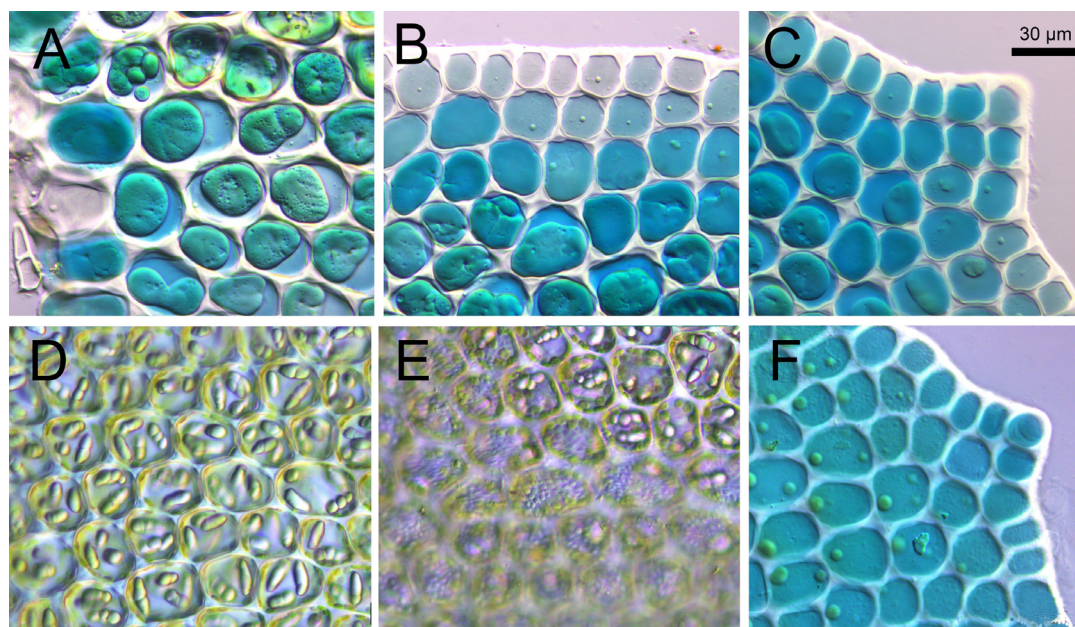


Figure 2. *Bazzania avittata*, leaf cells. A, at base, B, acroscopic margin. C, at apex, D, midleaf cells with oil-bodies, E, midleaf asperulate surface, F, leaf apex as in C but focused on the asperulate surface. 30 μm scale bar applies to A–F. A–C, and F bleached and stained with methylene blue. All photographed from the type (CHR 700570).

Branch half-leaf ovate, symmetrical, c. $630 \mu\text{m}$ long, c. $545 \mu\text{m}$ wide, margins entire, apex with a distinct tooth, auriculate at both bases, chlorophyllose throughout (Fig. 5A). First branch underleaf asymmetrically and deeply 3-fid, c. $295 \mu\text{m}$ long, c. $280 \mu\text{m}$ wide, sinus between first and second lobe $\times 0.4$ the length of the underleaf, sinus between second and third tooth $\times 0.14$ the length of the underleaf at that point (Fig. 5B). First tooth chlorophyllous with smooth surface. Second and third lobes hyaline and conspicuously asperulate, the hyaline zone also on the outer margin to the base (Fig. 5C). Underleaves slightly

wider than the stem, at c. 45° to the stem, narrowly connate by 2 cells on both sides; $300\text{--}350 \mu\text{m}$ long, $403\text{--}450 \mu\text{m}$ wide; wider than long (length:width ratio 0.8:1), plane, rectangular, apex truncate with 4–5 sharp-tipped teeth 1–3 cells long and 2 cells wide at base (Fig. 4A). Cells throughout chlorophyllose; hyaline outer margin absent (Fig. 4B). Cells at base $38\text{--}48 \times 25\text{--}30 \mu\text{m}$, grading to cells at the apex $30 \times 25 \mu\text{m}$, walls $1\text{--}3 \mu\text{m}$ thick, trigones moderate and slightly convex. Oil-bodies 2–4 per cell, similar to those of the leaf, $8\text{--}22 \times 7\text{--}9 \mu\text{m}$. Surfaces smooth. Asexual reproduction by caducous leaves sometimes present.

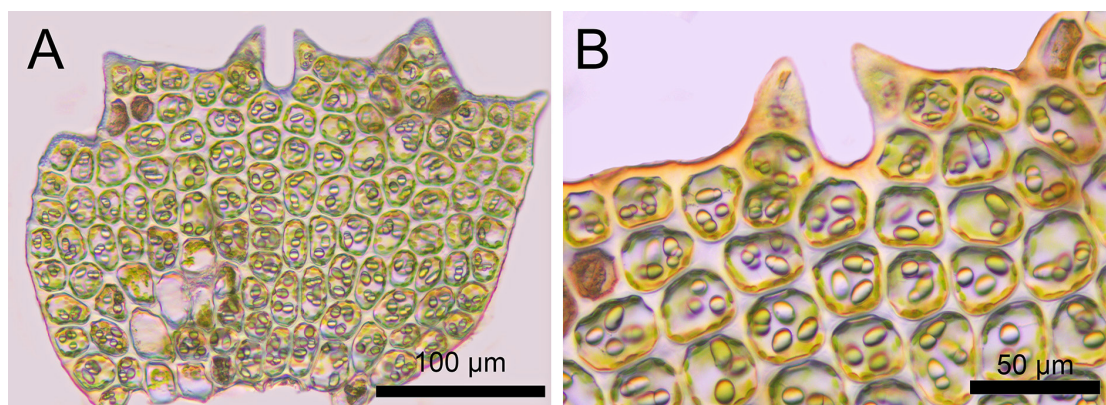


Figure 3. *Bazzania avittata*, underleaf. A, whole underleaf. B, apex showing no marginal row of hyaline cells. Photographed from the type (CHR 700570).

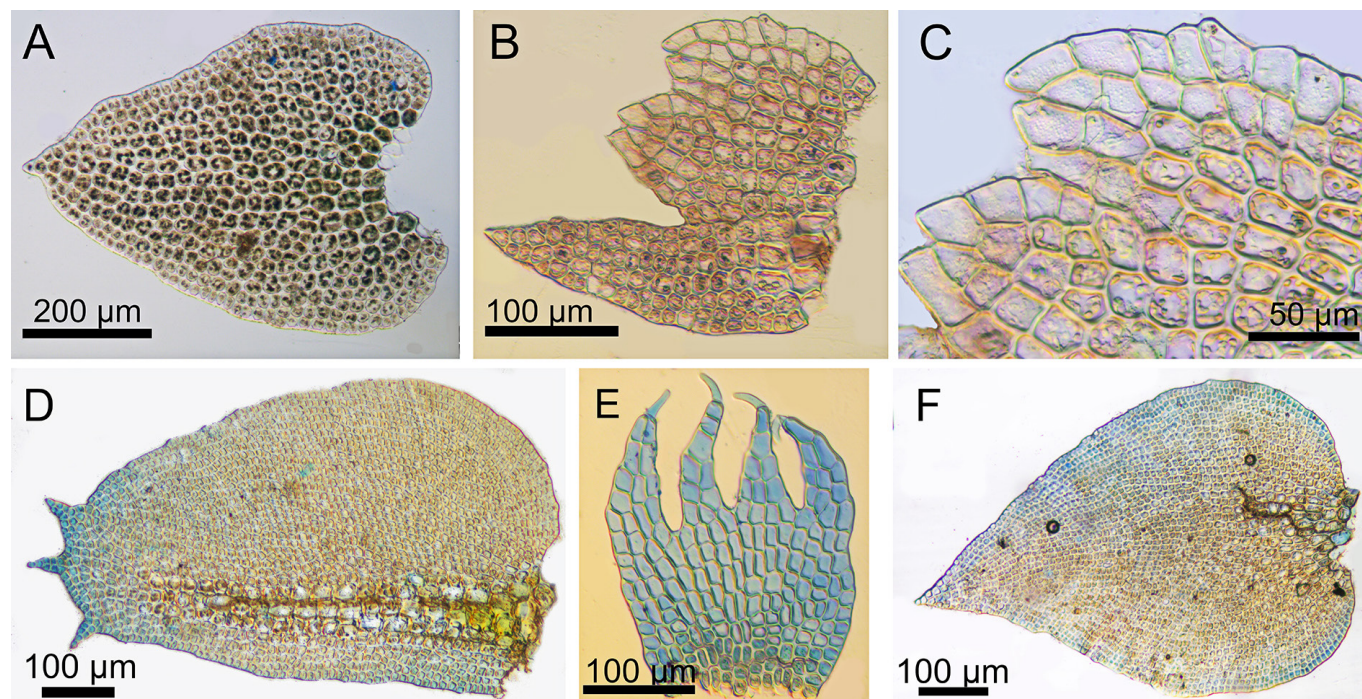


Figure 4. *Bazzania avittata* and *Bazzania nitida* leaf, underleaf, half leaf, and first branch underleaf. *Bazzania avittata*: A, half leaf. B and C, first branch underleaf with marginal hyaline cells with asperulate surface. A–C bleached but not stained. *Bazzania nitida*: D, leaf. E, underleaf. F, half leaf. All three bleached and stained with methylene blue. A–C photographed from the type (CHR 700570), D–F photographed from CHR 573641.

Distribution and ecology: Known only from the type locality, on a hillslope above the Heaphy River, 10 km inland (Fig. 5), in lowland forest of *Dacrydium cupressinum* emergent from a canopy of *Nothofagus fusca* and *Pterophylla racemosa*. Rainfall in the area averages over 4 meters per year (Department of Conservation 2025).

Etymology: *Avittata* means without a vitta which in *Bazzania* is a band of distinctly larger cells extending from the base toward the leaf apex and parallel to the ventral leaf margin (Fig. 4D). This feature is present in three New Zealand species have this (*B. monilinervis*, *B. nitida*, and *B. tayloriana*). In most New Zealand species the band is present, but cells grade at the edges of the band and the leaves are termed subvittate. *Bazzania avittata* has larger cells at the leaf base (1.5–2.0× those at the acroscopic margin) but they do not form a band parallel to the ventral leaf margin.

Conservation status: *Bazzania avittata* would qualify for listing as Data Deficient under the New Zealand Threatened Species Classification system (Townsend et al. 2008) because it is known from one locality. As there is nothing unusual about the forest type, it can be expected to be found elsewhere in the area.

Comparison to similar species

Bazzania avittata is compared to four New Zealand and one Australian species in Table 1. *Bazzania avittata* is most similar to *B. nitida* (Fig. 5D–F) and they share the following features: leaf length and width are similar (but leaves are more rectangular in *B. nitida*). The dorsal leaf margin is ampliate in both. Leaves are not caducous in either species.

Bazzania avittata differs from *B. nitida* in these respects: the leaves are not vittate. Leaf trigones are less convex than in *B. nitida*. Leaf surfaces are asperulate versus weakly striolate or smooth in *B. nitida*. All underleaf cells are chlorophyllose in *B. avittata* versus mostly hyaline in *B. nitida*. The underleaf has small teeth rather than deep lobes that are rounded at their apices (Fig. 5E).



Figure 5. Map of upper half of South Island of New Zealand showing the type locality of *Bazzania avittata* at Heaphy River.

Table 1. *Bazzania avittata* compared with New Zealand and Australian species of similar size and leaf shape.

	<i>B. avittata</i>	<i>B. nitida</i>	<i>B. hochstetteri</i>	<i>B. mittenii</i>	<i>B. engelii</i>	<i>B. amblyphylla</i>
Leaves caducous	no	no	caducous	caducous	no	no
Leaf length, µm	662–700	600–900	815–1020 (1750)	685–945	700–925	600–750
Leaf width, µm	578–618	365–530	390–600(750)	400–615	500–625	300–450
Leaf L:W ratio	1.1–1.2	1.6–1.7	1.3–2.3	1.5–1.7	1.2–1.7	1.9–2.2
Leaf vittate	not vittate	vittate	subvittate	subvittate	subvittate	vittate
Leaf ampliate	strongly	strongly	weakly	weakly	strongly	weakly
Leaf surfaces	asperulate throughout	smooth to striolate	smooth except at apex	smooth except at apex	smooth	smooth[?]
Leaf teeth	small	small	large	large	large	small
Leaf trigones	concave to neutral	convex	convex	convex	concave	concave
Leaf connate to underleaf, number of sides	2	0–1	(0–1)2	2	2	1
Underleaf apex	toothed	lobed	toothed	lobed	toothed	toothed
Underleaf hyaline border	absent	0.75× length	absent to 0.5× length	absent	absent to slight	absent

Of the 35 Australian species (Meagher 2019; Renner *et al.* 2024), *Bazzania avittata* is most similar to *B. amblyphylla*. They are similar in leaf size although *B. amblyphylla* has a less ampliate dorsal leaf base. Neither has caducous leaves. Underleaf cells are all chlorophyllous in both species. The lobes of the leaves and teeth of the underleaves are similarly small in both. They differ in these respects: the leaf of *B. avittata* is more strongly ampliate at the dorsal base. *Bazzania amblyphylla* has a distinct vitta, absent from *B. avittata*. The leaf surfaces of *B. amblyphylla* are presumed to be smooth, but this is not mentioned in the description (Meagher, 2019), while the surfaces are asperulate in *B. avittata*. *Bazzania amblyphylla* is very similar to *B. engelii* as seen in Table 1, and the distinctness of these two species should be assessed.

A key to New Zealand *Bazzania* species is provided below (modified from Glenny and Fish 2023).

Key to New Zealand *Bazzania* species

- 1a Leaves with a distinct vitta 2
- 1b Leaves avittate or subvittate, i.e. cells grade in size across the leaf width 4
- 2a Leaves glaucous, ice-blue under UV light *B. tayloriana*
- 2b Leaves not glaucous, faintly green or yellow under UV light 3
- 3a Leaves with apical teeth obscure or short, ending at most in 2 uniseriate cells *B. nitida*
- 3a Leaves with apical teeth ending in (5)6–8 uniseriate cells when intact *B. monilinervis*
- 4a Leaves 2.1–2.8 mm long; underleaves longer than wide *B. novae-zelandiae*
- 4b Leaves 0.6–1.47 mm long; underleaves wider than long or equal in length and width 5
- 5a Underleaves 4–6-lobed or deeply toothed to a depth of 0.3× underleaf length, underleaf lobe apices sharp *B. mittenii*
- 5b Underleaves toothed and/or lobed, when lobed, the lobes broadly rounded 6
- 6a Some leaves on shoots caducous leaving leafless areas of the stem 7

- 6b Leaves never caducous, leaves continuous 8
- 7a Leafy branches mostly ventral-intercalary; underleaves free; leaf acroscopic base weakly ampliate *B. exempta*
- 7b Leafy branches mostly terminal; underleaves 2-connate; leaf acroscopic base moderately to strongly ampliate *B. hochstetteri*
- 8a Leaf apices with accessory teeth among the three leaf lobes 9
- 8a Leaves without accessory teeth among the three leaf lobes 10
- 9a Underleaves 1134–1640 µm wide, strongly reflexed so that the adaxial surface is exposed to ventral view, margins not recurved wet or dry *B. involuta*
- 9b Underleaves 550–950(1025) µm wide, not strongly reflexed and at c. 45° to stem when dry, margins recurved to make the underleaf hooded *B. adnexa*
- 10a Leaves 660–700 µm long; leaf surfaces asperulate throughout, apical lobes often weak *B. avittata*
- 10b Leaves 1150–1900 µm long; leaf surfaces smooth except at lobe apices, apical lobes distinct 11
- 11a Leaves 1500–1800 µm long, leaf acroscopic base weakly ampliate; underleaves entire *B. okaritana*
- 11b Leaves 1000–1300 µm long; leaf acroscopic base moderately to strongly ampliate; underleaves toothed 12
- 12a Ventral-intercalary branches with normal leaves almost universal, terminal branches rare; underleaves (1)2-connate, lying against the stem, not recurved at the apex; leaf 430–575 µm wide *B. polita*
- 12b Ventral-intercalary branches 10–90% of normally leaved branches (on average 29%); underleaves invariably 2-connate, at 45° to the stem with the apex recurved; leaf 750–950 mm wide due to ampliate leaf base *B. engelii*

Specimen examined

Bazzania nitida

Western Nelson, Stockton Plateau, Ford Creek, 171.880993°E, 41.668492°S, 710 m, stream bank wall under *Halocarpus biformis* – *Lepidothamnus intermedius* – *Phyllocladus alpinus* scrub 4 m high, 14 Sept 2005, D. Glenny 9643 (CHR 573641).

Acknowledgements

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