

## BREUTELIA

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*Breutelia* (Bruch & Schimp.) Schimp., *Coroll. Bryol. Eur.* 85 (1856); named after Johann Christian Breutel (1788–1875), a German bryologist.

Type: *B. arcuta* (Sw.) Schimp.

*Bartramia* sect. *Breutelia* Bruch & Schimp., in Bruch, Schimper & von Gumbel, *Bryol. Eur.* 4: 1 (1851);  
*Bartramia* subg. *Breutelia* (Bruch & Schimp.) Hampe, *Ann. Sci. Nat. Bot.*, sér. 5, 3: 373 (1865).

Dioicous. Plants medium-sized to large, ±densely tufted, yellow, yellowish green, glaucous green, or bright green to blackish. Stems simple, sparingly branched or with subfloral innovations (most commonly branched near apex), red to reddish purple, tomentose in lower half. Rhizoids papillose, red-brown. Leaves unranked, imbricate, erect to squarrose, more spreading when moist, ovate-lanceolate, oblong-lanceolate to narrowly lanceolate, acuminate; margin plane or recurved, denticulate to serrate; costa strong, percurrent to long-excurrent; laminal cells ±regular, isodiametric to linear, with a single papilla overtopping cells; basal cells usually longer, subquadrate to rectangular; basal marginal cells ±inflated.

Capsules inclined to horizontal (rarely almost erect), cylindrical when dry, ovoid when moist; operculum convex, with or without an umbo. Peristome double; exostome teeth 16, finely papillose; endostome papillose; membrane c. one-third the height of the exostome; endostome processes slightly shorter than and alternating with exostome teeth. Spores globose, ovoid or reniform, verrucose.

This genus of approximately 125 species is especially diverse in temperate regions of the Southern Hemisphere. Traditionally only three rather variable species were recognised in Australia; however, two additional taxa are documented here.

Characteristically a cross-section of the stem of *Breutelia* shows a denticulate margin. This, along with the plication of the leaves, distinguishes it from other genera of the Bartramiaceae. Each year's new growth is often a paler colour and quite distinct from older growth.

### References

Jolley, H. & Klazenga N. (2007), A morphometric study of *Breutelia pendula* and *B. elongata* (Bryophyta, Bartramiaceae), *Austral. Syst. Bot.* 20: 82–91.

Scott, G.A.M. & Stone, I.G. (1976), *The Mosses of Southern Australia* 322–341.

Virtanen, V. (1996), Bryophyte flora of the Huon Peninsula, Papua New Guinea LIX. *Breutelia* (Bartramiaceae, Musci), *Acta Bot. Fenn.* 156: 49–62.

- 1 Leaves plicate only at the base (occasionally not plicate); alar cells not inflated; costa long-excurrent.....2  
1: Leaves plicate throughout; alar cells inflated; costa percurrent to short-excurrent.....4  
2 Leaves narrowly lanceolate; mid-leaf laminal cells elongate, thick-walled, porose (2) ..... 4. **B. pseudophilonotis**  
2: Leaves ovate-lanceolate to lanceolate; mid-leaf laminal cells thin-walled, not (or rarely) porose .....3  
3 Leaves ovate-lanceolate to oblong-lanceolate; subquadrate basal cells numerous, usually extending to one-third the height of the lamina; mid-leaf laminal cells irregular, isodiametric, short-rectangular to linear (2:) ..... 1. **B. affinis**  
3: Leaves lanceolate; subquadrate basal cells reduced (rarely absent), extending to one-fifth the height of the lamina; mid-leaf laminal cells short-rectangular..... 5. **Breutelia** sp. A

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- 4 Mid-leaf laminal cells regular, linear, porose, thick-walled; costa to 40 µm wide at the base (*1:*) ..... **2. B. elongata**
- 4: Mid-leaf laminal cells irregular, isodiametric to linear, ±porose, not as thick-walled; costa usually more than 40 µm wide at the base ..... **3. B. pendula**

### 1. *Breutelia affinis* (Hook.) Mitt., *Hooker's J. Bot. Kew Gard. Misc.* 8: 261 (1856)

*Bartramia affinis* Hook., *Musci Exot.* 2: 16 (1820); *Glyphocarpus affinis* (Hook.) A.Jaeger, *Ber. Tätigk. St. Gallischen Naturwiss. Ges.* 1873–74: 63 (1875); *Philonotis affinis* (Hook.) A.Jaeger, *Ber. Tätigk. St. Gallischen Naturwiss. Ges.* 1877–78: 505 (1879). T: Insula Van Diemen, [Tas.], R.Brown; BM? *n.v.*

*Bartramia commutata* Hampe, *Linnaea* 40: 307 (1876), *nom. illeg.*; *Breutelia commutata* A.Jaeger, *Ber. Tätigk. St. Gallischen Naturwiss. Ges.* 1877–78: 438 (1879). T: Grampians, Vic., W.Sullivan, syn: BM? *n.v.*, *fide* H.N.Dixon, *Bull. New Zealand Inst.* 3: 231 (1926).

Illustrations: D.G.Catcheside, *Mosses of South Australia* 287, fig. 172 (1980); D.Meagher & B.Fuhrer, *Field Guide to the Mosses and Allied Plants of Southern Australia* 131 (2003).

Stems to c. 7 cm long, dense, commonly branching towards the apices. Leaves imbricate, erect to erect-spreading when dry, ovate-lanceolate or oblong-lanceolate, tapering to an acuminate apex, plicate at base, 1.7–3.8 mm long, 0.4–0.9 mm wide; margin recurved in lower part of leaf, plane and denticulate above; costa long-excurrent, less commonly short-excurrent; mid-leaf laminal cells irregular in shape and size, isodiametric to short-rectangular and linear, with rounded ends, 6–40 × 2–6 µm, thin-walled (wall c. 2 µm), rarely porose, with a large patch (including many rows) of smooth subquadrate alar cells extending to c. one-third of the leaf lamina; alar cells c. 10 µm wide.

Setae c. 25 mm long. Capsules cylindrical and sulcate when dry, inclined or horizontal, rarely pendulous. Spores 24–32 (–36) µm diam. *n* = 6, *fide* H.P.Ramsay, *Austral. J. Bot.* 22: 318 (1974).

Occurs in W.A., S.A., Qld, N.S.W., A.C.T., Vic. and Tas.; also in New Zealand. This common species is found on rocks and soil in permanently or occasionally moist conditions. It can form very large mats covering rock faces.

W.A.: track to Hayward Peak, *H.Streimann* 54476 (CANB). S.A.: Hindmarsh Falls, *H.Streimann* 54805 (CANB). Qld: Blencoe Ck, Cardwell Ra., *H.Streimann* 37795 (CANB). N.S.W.: Parlour Ck, *S.R.Gilmore* 62 (CANB). A.C.T.: Molonglo Gorge, *P.J.Darbyshire* 488 (CANB). Vic.: Lookout Hill, Mount Cole State Forest, *H.Streimann* 55442 (CANB). Tas.: SW of Great Western Tiers, *J.A.Curnow* 2259 (CANB).

This moss is rather variable in its habit, and adjacent plants can look quite different in their leaf arrangement, the amount of stem tomentum, leaf shape and size, and the papillosity of the cells. The large number of subquadrate basal cells, and their distribution on the lamina distinguish this from other Australian *Breutelia* species. It can be separated from *Breutelia* sp. A by the numerous quadrate alar cells that extend one-third the length of leaf. Moreover, *B. affinis* also has a more ovate-lanceolate leaf shape and an abruptly tapered apex.

*Breutelia affinis* differs from *B. pseudophilonotis* in having numerous alar cells, thin-walled and irregular mid-leaf laminal cells, broader leaves and significantly smaller spores.

### 2. *Breutelia elongata* (Hook.f. & Wilson) Mitt., *Fragm.* 11 (Suppl.): 114 (1881)

*Hypnum elongatum* Hook.f. & Wilson, *London J. Bot.* 3: 551 (1844); *Bartramia elongata* (Hook.f. & Wilson) Mitt., *Handb. New Zealand Fl.* 449 (1867); *Prionodon elongatus* (Hook.f. & Wilson) A.Jaeger, *Ber. Tätigk. St. Gallischen Naturwiss. Ges.* 1875–76: 223 (1877). T: Lord Aucklands group [Auckland Is.] and Campbell Is; syn: BM? *n.v.*

*Bartramia crassa* Hook.f. & Wilson, in J.D.Hooker, *Fl. Tasman.* 2: 194 (1859); *Breutelia crassa* (Hook.f. & Wilson) A.Jaeger, *Ber. Tätigk. St. Gallischen Naturwiss. Ges.* 1873–74: 94 (1875). T: top of Western Mtns, Mt Wellington, Tas.; creek above the Wellington Falls, Tas., R.C.Gunn; A.F.Oldfield 101, 104, 106, 111; syn: NY? *n.v.* [Jolley & Klazenga (2007) included this in the synonymy of *B. pendula* (*q.v.*).]

Illustrations: G.A.M.Scott & I.G.Stone, *The Mosses of Southern Australia* 333, pl. 62 (1976); R.D.Seppelt, *The Moss Flora of Macquarie Island* 69, fig. 27 (2004).

Stems to c. 8 cm long, simple to sparingly branched. Leaves imbricate, erect-spreading to squarrose or appressed at the base and spreading above when dry, ovate-lanceolate, tapering

gradually to an acuminate apex, deeply and evenly plicate throughout leaf,  $\pm$ falcate and secund, 4.0–5.4 mm long, 0.9–1.3 mm wide; margin plane or slightly recurved below, serrulate to serrate above; costa percurrent to short-excurrent; mid-leaf laminal cells regular, linear with rounded ends, 18–40 (–60)  $\times$  4–5  $\mu$ m, longer below, porose, thick-walled (wall to c. 6  $\mu$ m); alar cells usually in 5 or 6 rows, inflated, short-rectangular, 20–50  $\times$  c. 15  $\mu$ m.

Setae to 35 mm long. Capsules sulcate when dry, inclined. Spores c. 20–22  $\mu$ m diam.

Occurs in Tas.; also in New Zealand and on Subantarctic islands, including Macquarie Island. This moss grows on soil and occasionally on rock in very moist conditions; often found growing with *Sphagnum*.

Tas.: Lake Hwy, 22 km SSE of Deloraine, *J.A.Curnow 2389* (CANB); Mount Field Natl Park, *A.V.Ratkowsky H138* (CANB); Cradle Mountain Natl Park, *D.McVean 267119* (CANB).

*Breutelia elongata* can be confused with the very similar *B. pendula*. However, the former has more densely packed leaves, thicker-walled porose laminal cells, a usually more rounded leaf base due to a thinner point of attachment and more deeply and evenly plicate leaves. The width of the costa base in *B. elongata* is often much narrower (30–40  $\mu$ m) than in *B. pendula* [(30–) 58–90  $\mu$ m].

This species was excluded from the continental Australian flora by Jolley & Klazenga (2007).

### 3. *Breutelia pendula* (Sm.) Mitt., *J. Proc. Linn. Soc., Bot.* 4: 82 (1860)

*Mnium pendulum* Sm., *Trans. Linn. Soc. London* 7: 262 (1804); *Bartramia pendula* (Sm.) Hook., *Musci Exot.* 1: 121 (1818). T: “Dusky Bay” [Dusky Sound], New Zealand, 1791, *A.Menzies*; BM? *n.v.*

*Bartramia sieberi* Hornsch. ex Müll.Hal., *Syn. Musc. Frond.* 1: 491 (1849); *Breutelia sieberi* (Hornsch. ex Müll.Hal.) Mitt., *J. Proc. Linn. Soc., Bot.* 4: 83 (1860). T: “Nova Hollandia” [Australia], *F.Sieber*; holo: *n.v.*

*Bartramia comosa* Mitt., in J.D.Hooker, *Fl. Tasman.* 2: 194 (1859); *Breutelia comosa* (Mitt.) Mitt., *J. Proc. Linn. Soc., Bot.* 4: 82 (1860). T: East Ck, and Cumming’s Head, Western Mtns, [Tas.], *W.Archer*; syn: NY *n.v.*; Wellington Falls, Mt Wellington, [Tas.], *S.Mossman 744*; syn: NY *n.v.*

*Bartramia divaricata* Mitt., in J.D.Hooker, *Fl. Tasman.* 2: 195 (1859); *Breutelia divaricata* (Mitt.) Mitt., *J. Proc. Linn. Soc., Bot.* 4: 83 (1860). T: Chestnut, [Tas.], *W.Archer*; holo: NY *n.v.*

*Bartramia reflexa* Müll.Hal., *Rev. Bryol.* 24: 73 (1897); *Breutelia reflexa* (Müll.Hal.) Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 161 (1906). T: Tingiring, N.S.W., 1889, *W.Baeuerlen*; iso?: MEL (not located).

*Breutelia fuscoareua* Broth., *Oefvers. Förh. Finska Vetensk.-Soc.* 42: 103 (1900). T: Lawson, N.S.W., *A.A.Hamilton 88*; holo: H-BR *n.v.*; iso: NSW *n.v.*

*Bartramia comiramea* Müll.Hal., *Genera Musc. Frond.* 344 (1901); *Breutelia comiramea* Müll.Hal., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 159 (1906), *nom. inval.* (in synonym.). T: not known.

*Bartramia campbelliana* Müll.Hal., *Genera Musc. Frond.* 348 (1901); *Breutelia campbelliana* (Müll.Hal.) Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 158 (1906). T: Hume R., Vic., *F.M.Campbell*; holo: BM; iso: NSW.

Illustrations: J.Beever, K.W.Allison & J.Child, *Mosses of New Zealand*, 2nd edn 105, fig. 47 (1992); R.D.Seppelt, *The Moss Flora of Macquarie Island* 71, fig. 28 (2004).

Stems to 14 cm long, simple to sparingly branched. Leaves imbricate, erecto-patent to squarrose when dry, lanceolate, gradually tapering to an acuminate apex, plicate throughout, 2.6–3.8 (–5.8) mm long, 0.7–1.1 (–1.6) mm wide; margin plane to slightly recurved below, serrulate above; costa percurrent to short-excurrent; mid-leaf laminal cells irregular, linear with rounded ends, short-rectangular or isodiametric, (8–) 10–42  $\times$  4–6  $\mu$ m; cell walls thin to thick, c. 2–6  $\mu$ m; alar cells inflated, c. 2–7 rows, rectangular to short-rectangular, 20–50  $\times$  10–18  $\mu$ m.

Setae c. 15 mm long. Capsules inclined to almost pendulous, ovoid to cylindrical, sulcate when dry. Spores c. 22–24  $\mu$ m diam. *n* = 6, *fide* H.P.Ramsay, *Austral. J. Bot.* 22: 318 (1974).

Occurs in N.S.W., A.C.T., Vic. and Tas.; also in New Zealand and Macquarie Island. In Australia it is found in very moist conditions, usually at higher elevations.

N.S.W.: Gang Gang Ck, 17 km NW of Adaminaby, *H.Streimann* 7371 (CANB). A.C.T.: Snowy Flats, 1.5 km NNE of Mt Gingera, *M.D.Crisp* 2030 (CANB). Vic.: Mt Baw Baw, 24 km ENE of Noojee, *H.Streimann* 50827 [*Musci Australas. Exsicc.* 181] (CANB). Tas.: Pipeline Track, Mt Wellington, *A.V.Ratkowsky* H142 (CANB).

*Breutelia pendula* is most similar to *B. elongata*; their differences are discussed under that species.

This species was listed for W.A. and Qld by H.Streimann & N.Klazenga (*Cat. Austral. Mosses* 28, 2002). However, no specimens could be examined to confirm these reports.

#### 4. *Breutelia pseudophilonotis* (Müll.Hal.) Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 161 (1906)

*Bartramia pseudophilonotis* Müll.Hal., *Genera Musc. Frond.* 342 (1901); *Philonotis pseudophilonotis* (Müll.Hal.) Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 156 (1906). T: Balls Head Bay, N.S.W., Aug.–Oct. 1884, *T.Whitelegge*; iso: NSW.

?*Bartramia atrata* Müll.Hal., *Genera Musc. Frond.* 342 (1901), *nom. nud.*; *Breutelia atrata* Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 158 (1906). T: N.S.W. n.v. ?type in Manchester Museum herbarium, *vide* G.C.S.Clark, *Manchester Mus. Publ.* 2.73: 1–20 (1973).

Stems c. 5 cm long (rarely to 15 cm), simple to richly branched (especially towards the tips). Leaves imbricate, erecto-patent to spreading, rarely squarrose when dry, narrowly lanceolate to lanceolate, gradually tapering to an acuminate apex, sometimes plicate at base, (1.9–) 2.3–3.9 mm long, 0.3–0.7 mm wide; margin plane throughout, occasionally slightly recurved below, serrate (rarely serrulate) above; costa long-excurrent; mid-leaf laminal cells regular, rectangular to linear, 42–90 × 3–5 µm, porose, thick-walled (wall 4–6 µm); alar cells apparently absent or in c. 3 or 4 rows of up to 5 cells, subquadrate to short-rectangular, to 30 × 10 µm.

Setae c. 15 mm long. Capsules erect to inclined or horizontal, ovoid to cylindrical, sulcate when dry. Spores 44–60 µm diam.

An endemic species in N.S.W., A.C.T., Vic. and Tas.; grows on damp to very moist rock and soil.

N.S.W.: near Mt Imlay trig., *M.D.Crisp* 3489 (CANB); Braeside Walk, Blue Mountains Natl Park, *F.E.Davies* 325 (CANB). A.C.T.: Australian National Botanic Gardens, Canberra, *H.Streimann* 2114 (CANB). Vic.: Kalymna Falls, Grampians Natl Park, *H.Streimann* 55219 (CANB). Tas.: near Devils Gate Dam, Kentish Municipality, *D.H.Norris* 27200 (CANB).

Most herbarium specimens of *B. pseudophilonotis* have been incorrectly labelled as *B. pendula*. However, the former is clearly distinct, having lanceolate leaves that are plicate only at the base (if at all), alar cells absent or subquadrate and not inflated, mid-leaf laminal cells that are commonly elongate, porose, thick-walled and regular, serrate upper leaf margins and distinctly larger spores.

#### 5. *Breutelia* sp. A

Stems to 6 cm long, variously branched, most commonly towards the apices. Leaves imbricate, erect-spreading when dry, lanceolate, gradually tapering to a broadly acuminate apex, plicate only at the base, 2.2–2.7 mm long, 0.47–0.62 mm wide; margin recurved below, denticulate or serrulate and plane above; costa excurrent to long-excurrent; mid-leaf laminal cells regular in shape and size, short-rectangular with rounded ends, 14–30 × c. 4 µm, thin-walled (wall c. 2 µm thick); subquadrate alar cells usually present (c. 10 µm wide), with up to 8 rows extending one-fifth the height of the lamina. Sporophyte unknown.

Four specimens are known from two localities above 1260 m in eastern N.S.W.

N.S.W.: Gloucester Tops, *H.Streimann* 439, 44075, 44078 (CANB); Peppercorn Hut, 48 km NNW of Adaminaby, *H.Streimann* 1685 (CANB).

In terms of vegetative morphology and anatomy this entity is most similar to *B. affinis*. It differs in the lanceolate leaf shape, gradually tapering apex, reduced alar regions extending

to only one-fifth the height of the lamina, and the more uniform size and shape of mid-leaf laminal cells. However, in the absence of sporophytes I am reluctant to describe it as new.

### Doubtful Names

The following names are likely to fall into synonymy with accepted species documented above. In all cases original descriptions are too vague and the type collections are likely to have been destroyed in B (March 1943).

*Breutelia baeuerlenii* (Müll.Hal.) Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 158 (1906)

*Bartramia baeuerlenii* Müll.Hal., *Genera Musc. Frond.* 351 (1901). T: Clyde R., N.S.W., *W.Baeuerlen*; holo: *n.v.*

*Breutelia crawfordii* (Müll.Hal.) Watts. & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 161 (1906), *nom. nud.*

*Bartramia crawfordii* Müll.Hal., *Genera Musc. Frond.* 347 (1901), *nom. nud.* Based on: Apsley R., New England, N.S.W., *Crawford*; *n.v.*

*Breutelia leptodontoides* (Müll.Hal.) Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 160 (1906)

*Bartramia leptodontoides* Müll.Hal., *Genera Musc. Frond.* 347 (1901). T: N.S.W.; *n.v.*

*Breutelia lonchopelma* (Müll.Hal.) Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 160 (1906)

*Bartramia lonchopelma* Müll.Hal., *Genera Musc. Frond.* 355 (1901). T: Snowy R., Gippsland, [Vic.], *coll. unknown*; holo: *n.v.*

*Breutelia luteola* Müll.Hal. ex Broth., *Rev. Bryol.* 24: 73 (1897)

*Breutelia luteola* Müll.Hal., *Rev. Bryol.* 3: 4 (1876), *nom. nud.*; *Bartramia luteola* (Müll.Hal. ex Broth.) Müll.Hal., *Genera Musc. Frond.* 347 (1901). T: near Sydney, N.S.W., *D.Kayser*, *n.v.*; Delegate District, N.S.W., *W.Baeuerlen*, *n.v.*

*Breutelia witherheadii* (Müll.Hal.) Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 161 (1906)

*Bartramia witherheadii* Müll.Hal., *Genera Musc. Frond.* 347 (1901). T: New England, N.S.W., *Witherhead*; holo: *n.v.*