

## BRYUM

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*Bryum* Hedw., *Sp. Musc. Frond.* 178 (1801); derived from the Greek *bryon* (a moss).

Lecto: *B. argenteum* Hedw.

*Anomobryum* Schimp., *Syn. Musc. Eur.* 382 (1860). Lecto: *A. julaceum* (Gaertn., Meyer & Scherb.) Schimp. [= *Bryum julaceum* Gaertn., Meyer & Scherb.]

Dioicous. Plants small, in dense turfs on damp soil and rock. Stems 1–4 mm long, julaceous, often branched by innovations. Leaves small, mostly less than 1 mm long, imbricate; apex obtuse to apiculate; margin usually plane, unbordered; costa weak, not reaching apex to percurrent, rarely short-excurrent, in cross-section lacking distinct guide cells; upper and mid-laminal cells rhomboidal to elongate-vermicular (3–10: 1 or more), often thick-walled; lower laminal cells abruptly quadrate to short-rectangular (1–2: 1), wider than cells above. Gemmae (leafy bulbils) often found in leaf axils of sterile shoots.

Perigonal and perichaetial leaves somewhat differentiated, rather enlarged and often with acute apices. Setae long-exserted, to 12 mm long. Capsules small, pendulous to erect, less than 1 mm long, variable in shape, ovate with a thickened neck to cylindrical with a narrow neck. Peristome double, highly variable, from well-developed with both an exostome and endostome, to the endostome segments being reduced and with low basal membrane, rarely almost lacking; cilia reduced or absent. Spores small, 8–20 µm diam.  $n = 10, 11, 12, 20$  (Fritsch, 1991).

A cosmopolitan genus of c. 50–60 species, most common in montane regions of the subtropics, tropics and the Southern Hemisphere, especially well represented in the Neotropics. Only a few species occur in temperate areas of the Northern Hemisphere. Five species are known from Australia.

Spence & Ramsay (1999) observed that *Bryum*, as lectotypified by *B. argenteum*, is closely related morphologically to *Anomobryum*, and while *B. argenteum* could readily be accommodated in *Anomobryum* (Ramsay & Spence, 2002), it was not representative of most other *Bryum* species. Spence & Ramsay (1999) proposed that *B. argenteum* should be transferred to *Anomobryum*, and that *Bryum* should be conserved with a new type (*B. caespiticium*). However, the Bryophyte Committee on Nomenclature rejected the proposal as premature [(1435), *Taxon* 51: 794, 2002], especially because the choice of *B. caespiticium* as a replacement type might not prove to be appropriate. Consequently, we have redefined *Bryum* as being represented in Australia by those species listed as *Anomobryum* by Spence & Ramsay (2002), and we have placed that genus in the synonymy of *Bryum*. Other species of *Bryum s. lat.* have been reassigned to other genera with the reinstatement of *Ptychostomum* Hornsch, the acceptance of *Plagiobryum* Lindb. and the description of *Gemmabryum* and *Ochiobryum* (Spence, 2005; Spence & Ramsay, 2005).

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- 1 Plants silvery; upper parts of leaves hyaline; costa variable, weak to excurrent .....2
- 1: Plants brown or green, not silvery; upper parts of leaves green; costa weak, not reaching apex (to percurrent in *B. harriottii*) .....4
  - 2 Leaf apex obtuse or rarely slightly apiculate; apiculus < 3 µm long and acuminate; leaves often cucullate; basal laminal cells predominantly short-rectangular (2: 1); upper-middle laminal cells broad (> 14 µm) (*1*) ..... **5. B. subrotundifolium**
  - 2: Leaf apex apiculate to acuminate; hairpoint or apiculus > 8 µm long; leaves not cucullate; basal laminal cells predominantly quadrate; upper and mid-laminal cells narrow (< 10 µm) .....3
- 3 Costa percurrent; leaf abruptly contracted to apiculus (*2:*) ..... **1. B. argenteum**
- 3: Costa excurrent in a hairpoint, strong; leaf acuminate ..... **4. B. lanatum**
- 4 Upper laminal cells elongate-vermicular (> 6: 1); tropical Qld (*1:*) ..... **2. B. auratum**
- 4: Upper laminal cells short and broad (2–3: 1); Tas. .... **3. B. harriottii**

### 1. *Bryum argenteum* Hedw., *Sp. Musc. Frond.* 181 (1801)

T: Europe; holo: G? *n.v.*

*Bryum argenteum* Hedw. var. *niveum* Wilson, in J.D.Hooker, *Fl. Tasman.* 2: 191 (1859). T: Surrey Hills, Hobart, Tas., *R.C.Gunn 1615*; holo: MEL.

*Bryum amblyolepis* Cardot, *Rev. Bryol.* 27: 45 (1900). T: South Africa; holo: PC? *n.v.*

*Bryum catenatum* Müll.Hal., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 142 (1906), *nom. nud.* (in synonym.). Based on: Qld, *coll. unknown*, MEL; Mt Ararat, Vic., *coll. unknown*; *n.v.*

*Bryum hampeanum* Müll.Hal., *Genera Musc. Frond.* 217 (1901), *nom. nud.* (in synonym.). Based on: Mt Ararat, Vic., *coll. unknown*; *n.v.*

Illustrations: A.Eddy, *Handb. Malesian Mosses* 3: 121, fig. 410 (1996); J.R.Spence & H.P.Ramsay, *Telopea* 9: 780, fig. 1 (2002), as *Anomobryum* sp.; R.D.Seppelt, *The Moss Flora of Macquarie Island* 97, fig. 36 (2004).

Plants small, in dense turfs, glossy silver-green when moist, silvery-hyaline when dry. Stems julaceous, fragile, crowded, 5–15 mm tall, branching by numerous subperichaetial innovations. Leaves ovate to ovate-lanceolate, 0.5–1.5 mm long, concave, imbricate, tapered somewhat abruptly to an obtuse apex; upper 25–50% of lamina hyaline; margin plane, usually unbordered; costa weak, percurrent or not reaching the apex, in cross-section lacking

guide cells and with a reduced stereid band; upper and mid-laminal cells rhomboidal-hexagonal, 40–70 µm long, 2–4: 1, thin or firm-walled; basal laminal cells predominantly quadrate, thin-walled. Gemmae (bulbils) often present in leaf axils of sterile stems.

Perichaetia on short stems; perichaetial leaves apiculate. Setae red, 12–20 mm long. Capsules short, to 2 mm long, pendulous, ovate, with a thick and often wrinkled neck, abruptly contracted to the seta, bright red at maturity; operculum convex, apiculate. Peristome double; exostome teeth 16, with a narrow border, tapering to a pale tip; outer face finely papillose; endostome segments 16, with narrow gaps; basal membrane half the height of the exostome teeth; cilia 1–3, short-appendiculate. Spores small, 8–15 µm diam. *n* = 10, *vide* H.P.Ramsay & J.R.Spence, *J. Hattori Bot. Lab.* 80: 258 (1996).

A common species throughout Australia, occurring in all States and Territories, especially in disturbed habitats, pavements, walls, soil, rock crevices, particularly in cities and towns. Prefers calcareous habitats and places with high levels of organic nitrogen. A cosmopolitan species, its range includes New Zealand and islands of the South Pacific Ocean.

W.A.: Porongorups Ra., 6 Oct. 1959, *G.G.Smith* (MEL ex WAU). S.A.: Kensington Park, Adelaide, *D.G.Catcheside* 79.155 (AD). N.T.: Uluru, *A.C.Beauglehole* 25880 (MEL). Qld: Tinaroo Dam, *W.B.Schofield* 80214 (NSW). N.S.W.: between Rous and Wardell, *H.P.Ramsay* R530 (NSW). A.C.T.: Naas Ck, 35 km SE of Canberra, *H.Streimann* 7937 (CANB). Vic.: Grampians, *D.Sullivan* (MEL 1000163). Tas.: Mt Wellington, 31 Mar. 1976, *D.A.* & *A.V.Ratkowsky* (MEL).

The abundance of *B. argenteum* in cities, in developed landscapes and other disturbed habitats, along with its general absence from native vegetation, suggest that it may have been introduced into Australia. Differences between this and the two other silvery Australian species, *B. lanatum* and *B. subrotundifolium*, are discussed below.

## 2. *Bryum auratum* Mitt., *J. Proc. Linn. Soc., Bot., Suppl.* 1: 67 (1859)

*Anomobryum auratum* (Mitt.) A.Jaeger, *Ber. Tätigk. St. Gallischen Naturwiss. Ges.* 1873–74: 142 (1875) (Ad. 1: 804). T: Lamben R., Nepal, 7000 ft, *J.D.Hooker* 513; syn: BM?, NY.

[*Anomobryum cymbifolium* auct. non (Lindb.) Broth.: H.Streimann & N.Klazenga, *Cat. Austral. Mosses* 17 (2002)]

Illustration: H.Ochi, *Hikobia* 5: 155, fig. 36 (1969).

Plants small, in dense golden-brown turfs. Stems julaceous, branching by numerous sub-perichaetial innovations. Leaves imbricate, broadly ovate, concave, 0.4–0.8 mm long, with apiculate to obtuse apices; upper portion of lamina green; margin smooth; costa weak, 50–67% the length of the leaf; upper and middle laminal cells elongate-vermicular, 30–45 µm long (at least 6: 1), thick-walled; lower cells lax, quadrate to short-rectangular. Gemmae unknown.

Setae short. Capsules short-ovate, horizontal to suberect, red when mature. Endostome and cilia rudimentary. Spores 11–13 µm diam. Chromosome number not known.

Extremely rare and local in north-eastern Qld; occurs in wet soil and on splashed rocks near water at moderately high elevations (900–1000 m). Also in Africa, SE Asia and the Philippines.

Qld: near park boundary, up-river of Little Millstream Falls, *J.R.Spence* 5129 (NSW); Wallaman Falls Natl Park, *I.G.Stone* 8518 p.p., 8508 (MEL); Millstream, Ravenshoe, *W.W.Watts* Q532 (NSW).

Australian collections are sterile, and the foregoing description of the sporophyte is based on that of Ochi (*op cit.* 154, 1969). Consequently, the identification of Australian plants remains tentative until sporophytes are found. Although the plants are similar to named specimens from elsewhere, they are somewhat smaller.

## 3. *Bryum harriottii* R.Br.bis, *Trans. & Proc. New Zealand Inst.* 31: 453 (1899)

*Anomobryum harriottii* (R.Br.bis) Dixon, *Bull. New Zealand Inst.* 3: 202 (1926). T: wet banks near Weka Pass, New Zealand, Apr. 1882, *R.Brown* s.n.; holo: WELT?

Illustrations: J.R.Spence & H.P.Ramsay, *Telopea* 9: 784, fig. 3 (2002), as *Anomobryum harriottii*; R.D.Seppelt, *The Moss Flora of Macquarie Island* 103, fig. 39 (2004).

Small plants in dense bright green turfs. Stems julaceous, to 20 mm tall, with numerous subperichaetial innovations. Leaves imbricate, ovate to orbicular, to 1 mm long, concave; upper portion of leaf green; apex obtuse; margin smooth; costa strong, almost reaching apex to percurrent; upper and middle laminal cells short and broad,  $10\text{--}25 \times 5\text{--}6 \mu\text{m}$  (2–4: 1), incrassate; basal cells short-rectangular. Gemmae unknown.

Setae 10–20 mm long. Capsules horizontal to pendulous, ovate to pyriform, with a narrow neck. Peristome double; exostome teeth 16; endostome segments reduced, with a short basal membrane; cilia absent or rudimentary. Spores 20–25  $\mu\text{m}$  diam. Chromosome number not known.

Very rare in Tas., but possibly overlooked; grows on damp rocks or soil-filled crevices on outcrops. Also in Macquarie Is. and widespread in the mountains of New Zealand as well as similar habitats in the New Zealand Subantarctic islands.

Tas.: Mt Franklin, 7 Jan. 1978, A.V.Ratkowsky s.n. (HO).

Australian collections are sterile, and the foregoing description of the sporophyte is taken from G.O.K.Sainsbury (*Bull. Roy. Soc. New Zealand* 5: 269, 1955). This species can be distinguished from *B. auratum* by the bright green colour and broad upper laminal cells.

#### 4. *Bryum lanatum* (P.Beauv.) Brid., *Muscol. Recent.*, Suppl. 3: 20 (1817)

*Mnium lanatum* P.Beauv., *Prodr. Aethéogam.* 75 (1805); *Bryum argenteum* Hedw. var. *lanatum* (P.Beauv.) Hampe, *Linnaea* 13: 44 (1839); *Bryol. Eur.* 4: 148 (1839) (Fasc. 6–9, Mon. 78); *Anomobryum lanatum* (P.Beauv.) J.R.Spence & H.P.Ramsay, *Telopea* 9: 785 (2002). T: locality not known.

*Bryum bateae* Müll.Hal., *Hedwigia* 37: 93 (1898). T: Mt Dromedary, N.S.W., 1883, *Miss Bate*; holo: MEL; iso: NSW.

*Bryum austroargenteum* Broth. ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 127 (1906), *nom. nud.* (in synonym.). Based on: [Milton], Brisbane, Qld, *H.Tryon s.n.* (BRI, MEL).

*Bryum rotundum* Hampe ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 143 (1906), *nom. nud.* Based on: Ararat, Vic., *F.M.Campbell s.n.* (BRI, MEL).

Illustrations: H.Crum & L.E.Anderson, *Mosses of Eastern North America* 2: 671, fig. 265H–I (1981), as *Bryum argenteum* var. *lanatum*; J.R.Spence & H.P.Ramsay, *Telopea* 9: 786, fig. 4 (2002), as *Anomobryum lanatum*.

Plants small, in dense hoary silver-white tufts. Stems julaceous, crowded, 5–15 mm tall, branching by numerous perichaetial innovations. Leaves imbricate, ovate-lanceolate, acuminate with a hyaline apex, 0.5–1.5 mm long; upper 25–50% of lamina hyaline; margin plane, mostly unbordered; costa strong, excurrent into a slender silver hairpoint, often weakly recurved when dry, in cross-section lacking guide cells and with a reduced stereid band; upper and mid-laminal cells rhomboidal-hexagonal,  $25\text{--}30 \times 6\text{--}8 \mu\text{m}$  (3–4: 1), firm-walled to incrassate; basal laminal cells predominantly quadrate, thin-walled. Gemmae as axillary leafy bulbils on sterile stems.

Perichaetial leaves lanceolate, acuminate, with a long hairpoint. Setae 15–20 mm long. Capsules rare, short, pendulous, to 2 mm long, ovate with a wide mouth and a thick and often wrinkled neck. Peristome double; exostome teeth 16, tapering; endostome segments 16; basal membrane at least half the height of the exostome; cilia 1–3, appendiculate. Spores small, 8–15  $\mu\text{m}$  diam. Chromosome number not known.

Widespread on dry soil or rock, especially in more arid parts of Australia (W.A., S.A., N.T., Qld, N.S.W., A.C.T. and Vic.) More common in the subtropical and tropical areas of Indo-Malesia.

W.A.: near Qualip HS, Fitzgerald R., *J.R.Spence 4165* (NSW). S.A.: Wilpena Pound, *D.G.Catcheside 53.238* (AD). N.T.: Mt Olga Gorge, *I.G.Stone 5140* (MEL). Qld: Mt Bellenden Ker, *I.G.Stone 12145* (MEL). N.S.W.: Mt Tinderry, Michelago, *H.Streimann 5215* (AD).

Although commonly considered to be a variety of *B. argenteum*, this is morphologically quite distinct among the silver species of *Bryum*, i.e. unlike most others, *B. lanatum* has a strong costa that is excurrent into a long, hyaline hairpoint. The presence of the hairpoint gives the species a hoary, whitish look. A few specimens are intermediate between

*B. lanatum* and *B. argenteum*, or occasionally display leaves of both types. However, where both species occur together they are distinct. Until more detailed studies of all silvery species are completed, we prefer to recognise *B. lanatum* as a discrete taxon.

**5. *Bryum subrotundifolium*** A.Jaeger, *Ber. Tätigk. St. Gallischen Naturwiss. Ges.* 1877–78: 43 (1879)

*Argyrobryum subrotundum* Hampe, *Linnaea* 40: 312 (1876), *nom. inval.*; *Anomobryum subrotundifolium* (A.Jaeger) J.R.Spence & H.P.Ramsay, *Telopea* 9: 787 (2002). T: Mt Ararat, Vic., 1875, *D.Sullivan s.n.*; iso: MEL, NSW.

Illustrations: R.D.Seppelt & T.G.A.Greene, *New Zealand J. Bot.* 36: 628, fig. 8; 629, fig. 9 (1998); J.R.Spence & H.P.Ramsay, *Telopea* 9: 788, fig. 5 (2002), as *Anomobryum subrotundifolium*.

Plants small, in dense silver-green turfs. Stems julaceous, fragile, 5–20 mm tall, sparsely branched by subperichaetial innovations. Leaves imbricate, broadly ovate to broadly ovate-lanceolate, 0.5–1.5 mm long, obtuse or occasionally tapered somewhat abruptly to a short apiculus (less than 3 µm), concave, often cucullate; upper 25–50% of lamina hyaline; margin plane, mostly unbordered; costa weak, percurrent or not reaching apex, in cross-section lacking guide cells and with a reduced stereid band; upper and mid-laminal cells rhomboidal-hexagonal, mostly more than 16 µm wide (2–3: 1), thin- or often firm-walled; basal laminal cells predominantly short-rectangular (2: 1), thin-walled. Gemmae not known; Australian plants sterile. Chromosome number not known.

Occurs in W.A., N.T., A.C.T., Vic. and Tas.; grows on dry rock or on soil over rock in exposed sites, often at moderately high elevations. Also in Macquarie Is. and Antarctica.

W.A.: Boorara, 10 km ESE of Kalgoorlie, *D.Kemsley* (MEL). N.T.: Kings Canyon, George Gill Ra., 2 July 1965, *A.C.Beauglehole* (MEL). A.C.T.: Cave Ck, Blue Waterholes, *J.R.Spence 4470* & *H.Streimann* (NSW). Vic.: Parkville, Melbourne, *I.G.Stone 11893* (MEL). Tas.: Mt Wellington, *D.A. & A.V.Ratkowsky B368* (MEL).

A poorly known and undercollected species, *B. subrotundifolium* is related to the silvery taxa *B. argenteum* and *B. lanatum*, but differs in the obtuse leaf apices, often cucullate leaves, broad laminal cells, the absence of a hairpoint or apiculus, and basal laminal cells that are rectangular rather than quadrate. Recent molecular and morphological studies also confirm its separation from *B. argenteum* (P.Selkirk, pers. comm.).

### Excluded Species

*Anomobryum filescens* E.B.Bartram, *Trans. Brit. Bryol. Soc.* 1: 468 (1951)

This species was reported from W.A. by Bartram (1951). According to Scott & Stone (1976, p. 124), the specimen is *Eccremidium pulchellum* (Hook.f. & Wilson) Müll.Hal. (Ditrichaceae).