

## PTYCHOSTOMUM

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*Ptychostomum* Hornsch., *Flora* 5, 2: syll. 62 (1822); from the Greek *ptyktos* (folded) and *stomum* (a mouth); reference uncertain.

Type: *P. pendulum* Hornsch.

Dioicous, synoicous or autoicous. Plants small to robust, in dense tufts or turfs. Stems erect, usually branched by perichaetial innovations, usually  $\pm$ radiculose. Rhizoids usually pale or red to red-brown, papillose. Leaves generally smaller and remote below and larger and often comose above, erect or erect-spreading, usually not much altered when moist or dry,  $\pm$ concave, usually rather broad, ovate or lanceolate to elliptic, sometimes narrowed at the base, and often decurrent, usually acute, rarely obtuse or rounded, frequently with a short or long acumen; margin smooth to serrate, often bordered with narrow elongate cells, sometimes bistratose; costa usually excurrent; upper laminal cells rhomboidal-hexagonal, rather broad and transparent; lower cells longer, narrower and rectangular; cells at stem insertion below alar region often inflated, reddish and forming a small auriculate group. Filiform gemmae rare in leaf axils.

Setae solitary, reddish, flexuose, curved or hooked at tip. Capsules mostly nodding or pendent, smooth, subcylindrical, clavate or pyriform, rarely ovoid to subglobose, symmetrical or slightly curved; operculum hemispherical or convex-conical or mammillose. Peristome reduced to well developed; exostome teeth lanceolate, acuminate, fused at the extreme base, yellow to brown, hyaline at the tips, usually bordered; endostome pale, finely papillose; basal membrane variable; cilia 1–3, often nodulose or appendiculate, rudimentary or lacking. Spores 8–50  $\mu$ m diam.

This is a large, predominantly Northern Hemisphere genus of 80–100 species. Five species are known in Australia.

Spence (2005) resurrected *Ptychostomum* for those species of Bryaceae with rhodobryoid laminal areolation, peristome reduction associated with nutant capsules, and a lack of asexual propagules other than occasional axillary filiform gemmae (e.g. *P. pseudotriquetrum*). *Ptychostomum* is further characterised by stems that are comose to elongate but not rosulate. Another useful character is the presence of an inflated, auriculate group of cells in the alar region of comal leaves (Spence, 2005). More than in any other genus of Bryaceae, the species in *Ptychostomum* are notoriously difficult to identify and, for some species, capsules with peristomes are essential.

### References

Spence, J.R. (2005), New genera and combinations in Bryaceae (Bryales, Musci) for North America, *Phytologia* 87: 15–28 (2005).

Spence, J.R. & Ramsay, H.P. (2005), New genera and combinations in the Bryaceae (Bryales, Musci) for Australia, *Phytologia* 87: 61–71.

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- 1 Synoicous; peristome reduced, with a low basal membrane; cilia usually short; spores mostly > 20 µm diam. .... **1. P. altisetum**
- 1: Dioicous or synoicous; peristome well developed; spores < 20 µm diam. ....2
- 2 Plants 1–5 (–10 cm) tall; stems elongate, with equidistant decurrent leaves, usually strongly tomentose, sparingly branched; laminal cells distinctly incrassate; costa percurrent to short-excurrent; leaf border strong; upper margin denticulate (1:) ..... **5. P. pseudotriquetrum**
- 2: Plants to 3 cm tall; leaves densely tufted, comose, not decurrent, tomentose below; laminal cells mostly thin-walled; costa short- to more commonly long-excurrent; leaf border variable, sometimes weak; upper margin usually entire or finely serrulate .....3
- 3 Synoicous; leaf border distinct (2:) ..... **3. P. creberrimum**
- 3: Dioicous; leaf border weak or almost lacking .....4
- 4 Leaves ovate to ovate-lanceolate; upper and middle laminal cells elongate, 50–70 × 10–12 µm (5–6: 1) (3:) ..... **2. P. angustifolium**
- 4: Leaves ovate to obovate; upper and middle laminal cells shorter and broader, 30–60 × 12–18 µm (3–4: 1) ..... **4. P. cylindrothecium**

**1. Ptychostomum altisetum** (Müll.Hal.) J.R.Spence & H.P.Ramsay, *Phytologia* 87: 63 (2005)

*Bryum altisetum* Müll.Hal., *Hedwigia* 37: 96 (1898). T: Moyston, Vic., Oct. 1883, *D.Sullivan* 551; lecto: H, fide H.Ochi, *J. Fac. Educ. Tottori Univ. Nat. Sci.* 21: 43 (1970); Dimboola, Vic., Oct. 1893, *F.M.Reader* 4; syn: H; near Hot Springs, Yarrangobilly Caves, N.S.W., *W.W.Watts* 8565; syn: NSW.

*Bryum humilisetum* Müll.Hal., *Hedwigia* 37: 97 (1898), *nom. inval.* (in synonym); *Bryum altisetum* Müll.Hal. var. *humilisetum* Müll.Hal., *Hedwigia* 37: 96 (1898). T: Moyston, Vic., Oct. 1883, *D.Sullivan* 14d; holo: MEL.

[*Bryum inclinatum* auct. non (Brid.) Bland: D.G.Catcheside, *Mosses of South Australia* 253 (1980)]

Illustrations H.Ochi, *J. Fac. Educ. Tottori Univ. Nat. Sci.* 21: 44, fig. 25 (1970), as *Bryum altisetum*; A.J.E.Smith, *Moss Flora of Britain and Ireland* 398, fig. 187 (6–11) (1978), as *Bryum inclinatum*; D.G.Catcheside, *Mosses of South Australia* 254, fig. 145 (1980), as *Bryum inclinatum*.

Synoicous. Plants to 10 mm tall, loosely to densely tufted, yellowish green. Leaves crowded above in comal tufts, appressed and straight to somewhat crisped when dry, erecto-patent when moist, ovate-lanceolate to oblong-lanceolate, 1.5–3.0 mm long, not or weakly decurrent, acuminate; base of leaf reddish; leaves of sterile innovations somewhat smaller and imbricate, concave; margin recurved, finely denticulate above, bordered by 3 or 4 rows of very narrow incrassate cells; costa short- to long-excurrent, yellowish to brown; upper and middle laminal cells 40–70 × 10–15 µm (3–4: 1), thin-walled; basal cells long-rectangular; angular cells at insertion of comal leaves inflated and reddish.

Setae slender, 10–20 mm long. Capsules inclined to pendulous, narrowly pyriform, 1.5–3.5 mm long, symmetrical; mouth yellowish; operculum mammillose. Peristome reduced; exostome teeth reddish below, yellow above, with lamellae; endostome segments with broad perforations, papillose along mid-line; basal membrane low; cilia rudimentary or 1 or 2 and short. Spores 18–25 µm diam. Chromosome number not known.

Occurs in N.S.W., A.C.T. and Vic. and, possibly, in New Zealand. Grows in tufts on soil and rock, predominantly subalpine to alpine in Australia.

N.S.W.: Yarrangobilly Caves, *A.J.Downing s.n.* (NSW); *loc. id.*, *W.W.Watts* 8551 (NSW); Snowy Mtns, *D.G.Catcheside* 54.70 (AD). A.C.T.: Warks Rd, Brindabella Ra., *H.Streimann* 4749 (CANB). Vic.: Echo Flat, Lake Mtn, near Marysville, *J.H.Willis* 77 (MEL).

*Ptychostomum altisetum* is most similar to *Bryum inclinatum*, a widespread, montane species in the Northern Hemisphere. However, there are subtle differences between the two species in leaf and peristome characters, and we prefer to maintain *P. altisetum* as a distinct species pending a worldwide revision.

**2. *Ptychostomum angustifolium* (Brid.) J.R.Spence & H.P.Ramsay, in J.R.Spence, *Phytologia* 87: 23 (2005)**

*Bryum angustifolium* Brid., *Muscol. Recent.*, Suppl. 3: 31 (1817). T: Germany; *n.v.*

*Bryum caespiticium* Hedw., *Sp. Musc. Frond.* 180 (1801), non *Ptychostomum caespiticium* Brid., *Bryol. Univ.* 1: 837 (1827). T: Europe; *n.v.*

*Bryum caespiticium* Hedw. var. *crinitum* Wilson, in J.D.Hooker, *Fl. Tasman.* 2: 191 (1859). T: Hobartton [Hobart], Tas., *R.C.Gunn* 24; syn: BM; Port Sorrell, Tas., *W.Archer*; syn: BM.

*Bryum laxirete* Broth., *Proc. Linn. Soc. New South Wales* 41: 588 (1916). T: Emu Plains, N.S.W., *W.Forsyth* 1019; syn: H-BR; Warrumbungle Ra., N.S.W., *W.Forsyth* 1022; syn: H-BR; Jenolan Caves, N.S.W., *Blakely* 970; syn: H-BR; isosyn: NSW; Hill Top, N.S.W., *J.H.Maiden* 406; isosyn: NSW; near Barbers Creek, N.S.W., *W.Forsyth* 409. syn: H-BR.

*Bryum capitellatum* Müll.Hal. ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 130 (1906), *nom. nud.* Based on: Vic., 2 Aug. 1896, *F.M.Reader* (MEL).

Illustrations: H.C.Gangulee, *Mosses of Eastern India and Adjacent Regions* 2: 996, fig. 483 (1974); A.J.E.Smith, *Moss Flora of Britain and Ireland* 413, fig. 196 (1–4) (1978); D.G.Catcheside, *Mosses of South Australia* 265, fig. 154 (1980), all as *Bryum caespiticium*.

Dioicous. Plants 10–20 mm tall, densely tufted, pale bright silky green above, brownish-tomentose below. Stems slender, comose, with slender innovations. Leaves scarcely or slightly twisted when dry, imbricate, erect when moist; uppermost leaves forming a crowded coma, ovate to oblong lanceolate, widest below middle, not decurrent, acuminate; innovation leaves smaller, ovate and strongly concave; margin revolute almost to apex, ±entire; marginal cells narrow but not forming a distinct border; costa usually excurrent in a long entire arista, yellowish to reddish brown; laminal cells narrowly hexagonal to rhomboidal, 50–70 × 10–12 µm (5–6: 1), thin-walled; basal cells long rectangular; angular walls of alar region of comal leaves swollen, pinkish.

Setae slender, 10–20 mm long. Capsules oblong-pyriform or clavate, 2.0–2.5 mm long, cernuous or pendulous; apophysis thick, often somewhat gibbous, shorter than urn, tapering to the seta; mouth wide; operculum, convex, slightly apiculate. Exostome teeth pale brown; endostome segments broadly perforate; basal membrane high, half the length of the exostome; cilia 2, long-appendiculate. Spores 10–16 µm diam. *n* = 30, *fide* H.P.Ramsay & J.R.Spence, *J. Hattori Bot. Lab.* 80: 260 (1996), as *Bryum caespiticium*; “*n* = 20” is an error.

Occurs in W.A., N.T., S.A., N.S.W., A.C.T. Vic. and Tas.; common on dry sandy or silty soils and rocks especially in mallee or sclerophyll scrub. A ±cosmopolitan species in temperate regions, but rare in the tropics.

W.A.: Wansborough Walk to Granite Domes, Porongurup Natl Park, *J.R.Spence* 4196 (NSW). N.T.: Kakadu Natl Park, *L.A.Craven* 6145A (CANB). S.A.: Glenelg R., *D.G.Catcheside* 55.130 (AD). N.S.W.: Warrumbungle Ra., *W.Forsyth* 1022 (NSW). A.C.T.: Two Sticks Rd, near Piccadilly Circus, Brindabella Ra., *N.T.Burbidge* 7065 (CANB). Vic.: Manna Falls, near Hamilton, *H.P.Ramsay* 8/77, 9/77 (NSW).

The elongate, thin-walled laminal cells, the absence of a distinct leaf border, and the long-excurrent hairpoint are diagnostic.

**3. *Ptychostomum creberrimum* (Taylor) J.R.Spence & H.P.Ramsay, in J.R.Spence, *Phytologia* 87: 23 (2005)**

*Bryum creberrimum* Taylor, *London J. Bot.* 5: 54 (1846). T: Swan River, W.A., *J.Drummond s.n.*; holo: BM.

*Bryum affine* Schultz, *Flora* 54: 476 (1871), *nom. illeg.* (later homonym). T: Swan R., W.A., *J.Drummond s.n.*; holo: *n.v.*

[*Bryum intermedium* auct. non (Brid.) Bland: H.Streimann & N.Klazenga, *Cat. Austral. Mosses* 33 (2002)]

Illustrations: A.J.E.Smith, *Moss Flora of Britain and Ireland* 410, fig. 194 (5–8) (1978); D.G.Catcheside, *Mosses of South Australia* 255, fig. 146 (1980), both as *Bryum intermedium*.

Synocious. Plants 10–30 mm tall, densely tufted, yellow-green above, reddish brown below, tomentose. Stems comose, branched. Leaves erecto-patent when moist, a little twisted when dry, lanceolate to ovate-lanceolate, not decurrent, tapering to an acuminate apex; margin strongly recurved, entire or denticulate near apex; costa reddish, excurrent in a short point;

middle and upper laminal cells rhomboidal to hexagonal, 40–70 × 10–15 µm (3–4: 1), thin-walled; several marginal rows of longer narrower more incrassate cells forming a distinct border; basal cells long-rectangular; cells in lower alar region of comal leaves inflated, reddish.

Setae slender, 15–30 mm long. Capsules inclined to pendulous, symmetrical, narrowly pyriform, 2.5–3.5 mm long; operculum mammillose. Peristome well developed; exostome teeth narrowly lanceolate, brownish red; endostome segments with long perforations, c. as wide as long; basal membrane to c. half the height of the teeth; cilia 2, appendiculate. Spores 14–16 µm diam.  $n = 30$ , *fide* H.P.Ramsay & J.R.Spence, *J. Hattori Bot. Lab.* 80: 260 (1996), as *Bryum creberrimum*.

Widespread in W.A., S.A., N.S.W., A.C.T., Vic. and Tas.; uncommon on soil or in rock crevices, prefers sandy, basic substrata. A pantemperate species in both hemispheres.

W.A.: Two Peoples Bay Nature Reserve, 30 km E of Albany, *R.Wyatt & A.Stoneburner 3769* (PERTH). S.A.: Lees Springs, *D.G.Catcheside 54.38* (AD). N.S.W.: trail above Blue L., Charlotte Pass, Kosciuszko Natl Park, *J.R.Spence 4748* (NSW). A.C.T.: Brumby Flats, Brindabella Ra., *L.Craven 545* (CANB). Vic.: Bogong High Plains, *J.H.Willis s.n.* (MEL). Tas.: Orford, 23 Sept. 1984, *D.G.Catcheside* (AD).

*Ptychostomum creberrimum* can be distinguished by its synoicous perichaetia, elongate thin-walled laminal cells, leaf border and usually short-excurrent costa. This is very similar to the Northern Hemisphere species *Bryum lisae* De Not.

#### 4. *Ptychostomum cylindrothecium* (R.Br.ter.) J.R.Spence & H.P.Ramsay, *Phytologia* 87: 63 (2005)

*Bryum cylindrothecium* R.Br.ter., *Trans. & Proc. New Zealand Inst.* 31: 452 (1899). T: Waikari, New Zealand, Apr. 1882, *R.Brown*; holotype: CHR.

Dioicous. Plants in dense tufts to 15 mm tall, yellowish green above. Stems branched by a few perichaetial innovations, brownish-tomentose below. Leaves crowded in the upper part of the stem; lower leaves closely imbricate when dry, not much altered when moist, ovate or obovate with an acute apex and a non-decurrent base, to 1.5 mm long, strongly concave, innovation leaves smaller; margin plane or slightly reflexed in median to basal parts, entire; costa strong, long-excurrent with an arista, red towards the base; laminal cells thin-walled, hexagonal or rhomboidal-hexagonal, to 30–60 × 12–18 µm (3–4: 1); basal cells rectangular, indistinctly bordered by 1 or 2 rows of thin-walled more elongate cells; alar region of slightly inflated pinkish cells.

Setae slender, erect, to 15–20 mm long. Capsules nutant to subpendulous, oblong-pyriform, 3.0–3.5 mm long, pale brown; operculum convex, slightly apiculate. Peristome well developed; exostome teeth pale brown; endostome segments perforate; basal membrane high, half the length of the exostome; cilia 2 or 3, appendiculate. Spores 10–12 µm diam. Chromosome number not known.

Occurs on sandy soil in southern S.A.; also in New Zealand. Reported here for the first time from Australia.

S.A.: Kangaroo Is., 28 Aug. 1948, *H.B.S.Womersley* (AD); Coorong, opposite Campbell Pt, *V.Levitzke 968* (AD).

*Ptychostomum cylindrothecium* can be separated from *P. angustifolium* by its distinctive leaf shape and broader laminal cells.

#### 5. *Ptychostomum pseudotriquetrum* (Hedw.) J.R.Spence & H.P.Ramsay, *in* J.R.Spence, *Phytologia* 87: 23 (2005)

*Mnium pseudotriquetrum* Hedw., *Sp. Musc. Frond.* 190 (1801); *Bryum pseudotriquetrum* (Hedw.) Schwägr., *Sp. Musc.*, Suppl. 1, 2: 110 (1816). T: Europe; *n.v.*

*Bryum ventricosum* Dicks. ex Relh., *Fl. Cantab.* 2nd edn, 427 (1802), *nom. illeg.* T: Europe; *n.v.*

*Bryum tasmanicum* Hampe, *Linnaea* 25: 714 (1853). T: Van Diemensland, [Tas.], 1850, *Stuart*; holotype: BM; isotype: MEL.

*Bryum rubiginosum* Hook.f. & Wilson, in J.D.Hooker, *Fl. Tasman.* 2: 190 (1859). T: St. Patricks, Tas., R.C.Gunn; holotype: MEL.

*Bryum austroaffine* Broth., *Proc. Linn. Soc. New South Wales* 41: 587 (1916). T: Yarrangobilly Caves, N.S.W., *W.Forsyth 1012, 1014*; syn: H-BR; isosyn: NSW; Kiandra, N.S.W., *W.Forsyth 1010, 1011*; syn: H-BR; isosyn: MEL, NSW.

*Bryum subventricosum* Broth., *Proc. Linn. Soc. New South Wales* 41: 586 (1916). T: Tumbarumba, N.S.W., *W.Forsyth 725*; holotype: H-BR; isotype: NSW.

*Bryum subpseudotriquetrum* Broth. ex Burges, *Proc. Linn. Soc. New South Wales* 60: 93 (1935), *nom. nud.* Based on: Tumbarumba, N.S.W., *W.Forsyth 725* (NSW).

Illustrations: H.Ochi, *J. Fac. Educ. Tottori Univ. Nat. Sci.* 21: 45, fig. 26A–F (type of *Bryum tasmanicum*); G–J (syntype of *Bryum austroaffine*); 46, fig. 27A–G (type of *Bryum subventricosum*); H (*Bryum rubiginosum*) (1970); D.G.Catcheside, *Mosses of South Australia* 260, fig. 150 (1980), as *Bryum pseudotriquetrum*; R.D.Seppelt, *The Moss Flora of Macquarie Island* 109 fig. 42 (2004), as *Bryum pseudotriquetrum*.

Dioicous in Australia. Plants 1–5 (–10) cm tall, in dense tufts or open mats, glossy, greenish to reddish. Stems densely matted below with red-brown rhizoids. Leaves uniform and equidistant on stem, crowded at apex, shrunken when dry, erecto-patent when moist, ovate to ovate-lanceolate, 2.0–3.5 mm long, decurrent, acute; margin recurved, denticulate above, decurrent; costa stout, percurrent to short-excurrent, reddish brown; upper laminal cells broadly hexagonal, 20–40 × 12–20 µm (2–3: 1), incrassate; elongate marginal cells forming a distinct border; basal cells short- to long-rectangular, reddish; alar region of comal leaves with a group of larger inflated cells.

Setae slender, mostly straight, 10–30 mm long. Capsules ±pendulous, broadly pyriform, 3.0–4.5 mm long; operculum conical. Peristome well developed; exostome teeth orange-brown below, papillose at tips; endostome segments broadly perforate; basal membrane half the height of the exostome; cilia 2 or 3, filiform, long-appendiculate. Spores 12–18 µm diam., finely papillose. Chromosome number not known.

Occurs in N.S.W., A.C.T., Vic. and Tas. A plant of wet soils, fens, wet heaths and marshes, usually low-alpine, but also in lowland acidic marshes. Also in Europe, Asia, North and South America, West Africa, New Zealand and Antarctica.

N.S.W.: Mt Kosciuszko, *D.G.Catcheside 54.66* (AD). A.C.T.: Tidbinbilla, 18 Mar. 1975, *D.G.Catcheside* (NSW). Vic.: Bogong High Plains, 17 Jan. 1970, *M.Blackwood* (AD). Tas.: Mt Wellington, *A.V.Ratkowsky H573* (CANB).

*Ptychostomum pseudotriquetrum* is characterised by its comparatively large size, the elongate, densely tomentose stems, decurrent leaves with a short, stout point and broad, incrassate upper laminal cells. Northern Hemisphere populations occasionally produce filiform gemmae in the leaf axils as in *Rosulabryum*, and also include shorter, comose synoicous forms that have not been seen in Australia. *Gemmabryum laevigatum* often grows with *P. pseudotriquetrum*, but it is readily distinguished by its obtuse leaves, extremely dense areolation, and the absence of dense tomentum on the stems.