

ROSULABRYUM

John R. Spence¹ & Helen P. Ramsay²

Rosulabryum J.R.Spence, *Bryologist* 99: 222 (1996); from the Latin *rosula* (a rosette) and the Greek *bryon* (a moss), in reference to the leaves being clustered in rosettes.

Type: *R. albolimbatum* (Hampe) J.R.Spence

Dioicous or rarely synoicous or polyoicous. Plants small to large; stems 0.5–10 cm tall, branched by subfloral innovations, in open turfs. Stems mostly strongly rosulate, often densely radiculose, with coloured papillose rhizoids. Leaves ovate, obovate to spatulate, variously contorted to spirally twisted around the stem when dry; upper margin denticulate to serrate by projecting cell ends or, occasionally, with distinct cellular teeth; costa strong, usually excurrent, in cross-section with a well-developed band of stereids; guide cells in 1 (or 2) layers; upper and mid-laminal cells short-rhomboidal (3–5: 1), sometimes porose, progressively rectangular and somewhat longer below, usually with a border of thickened elongate cells. Gemmae as axillary uniseriate filaments in some species; rhizoidal tubers usually present.

Inner perichaetial and perigonial leaves somewhat differentiated, generally smaller than vegetative leaves. Setae solitary or sometimes polysetose and clustered, slender, elongate, smooth. Capsules clavate to pyriform, often somewhat arcuate, nutant to inclined; operculum conical. Peristome rather uniform, double; exostome teeth 16, irregularly striate on outer surface; endostome segments 16, the same height as the exostome, broadly perforated; basal membrane high, 33–67% the length of the exostome, papillose; cilia 2 or 3, appendiculate. Spores 8–25 µm diam. $n = 10, 11, 20$, polyploid series in synoicous species, *vide* R.Fritsch, *Bryophyt. Biblioth.* 40: 1–352 (1991), as various *Bryum* spp.; H.P.Ramsay & J.R.Spence, *J. Hattori Bot. Lab.* 80: 260–262 (1996).

Rosulabryum comprises the rosulate species of *Bryum s. lat.* with unreduced peristomes, generally obovate leaves with serrate margins, rhizoidal tubers and, occasionally, filiform gemmae in the leaf axils. The genus includes c. 75–100 species, of which 14 (five endemic) occur in Australia. One species included in the following key, *R. perlimbatum* Cardot, has not yet been found in Australia, although it is known from the South Island of New Zealand and Subantarctic islands. The genus exhibits a primary radiation within the tropics and subtropics, and it is especially diverse in Africa. *Rosulabryum* is related to *Brachymenium*, and while *Rhodobryum* is superficially similar, recent molecular studies suggest it is not closely related to *Rosulabryum* (Pedersen *et al.*, 2003).

References

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¹ Glen Canyon National Recreation Area, 691 Scenic View Drive, P.O. Box 1507, Page, Arizona 86040-1507, U.S.A.

² c/- National Herbarium of New South Wales, Royal Botanic Gardens and Domain, Mrs Macquaries Road, Sydney, New South Wales 2000, Australia.

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- 1 Filiform gemmae usually present in leaf axils of sterile stems.....2
- 1: Filiform gemmae absent or rare4
- 2 Stems with equidistant leaves, not rosulate; leaves ovate, rarely obovate; upper margin serrulate or entire; costa percurrent or short-excurrent as a mucro; epiphytic (1)..... **5. R. epiphyticum**
- 2: Stems short and rosulate or, if elongate, the leaves strongly coarsely serrate; leaves mostly obovate; upper margin distinctly serrate; costa not reaching apex, percurrent or excurrent; on soil, rock or decaying wood.....3
- 3 Leaves strongly keeled, narrowly ovate to spatulate, sharply serrate in upper half; filamentous gemmae with ±smooth walls (2:)..... **6. R. lamingtonicum**
- 3: Leaves flat when moist, broadly obovate, serrate near apex; filamentous gemmae coarsely papillose **1. R. albolimbatum**
- 4 Laminal cells elongate, to 125 µm long and 6–8: 1; rhizoidal tubers flattened, with strongly projecting cell walls (1:)..... **13. R. tuberosum**
- 4: Laminal cells mostly shorter and/or broader, generally < 80 µm long and 2–6: 1; tubers globose, with cell walls not projecting, or tubers absent5
- 5 Polyioicous; leaves contorted when dry, only rarely spirally twisted around stem; tubers bright orange or crimson (4:) **12. R. torquescens**
- 5: Dioicous; leaves variously contorted, twisted or imbricate when dry; tubers mostly red-brown, rarely red to orange6
- 6 Most leaves < 3 mm long, sometimes spirally twisted around stem; tubers mostly < 300 µm wide (5:).....7
- 6: At least some leaves 4–10 mm long or longer, contorted but not spirally twisted around stem, or sometimes imbricate; tubers mostly > 500 µm wide 11
- 7 Stems to 10 mm long; leaves to 1 mm long, rosulate, ovate; border weak or absent above; rhizoidal tubers mostly < 1.5 mm long, reddish brown, irregularly globose, elliptic or pyriform (6) **9. R. queenslandicum**
- 7: Stems more than 10 mm long, if shorter leaves serrate distally; leaves 1–3 mm long, obovate or, if ovate, the upper laminal cells elongate (4–6: 1); tubers > 100 µm, usually globose.....8
- 8 Leaves keeled, narrowly ovate-lanceolate or spatulate, not rosulate except for perichaetial and perigonal buds; margin distinctly serrate in upper half of leaf; rhizoidal tubers brownish (7:) **6. R. lamingtonicum**
- 8: Leaves flat, not keeled, obovate to ovate, serrate to almost entire; teeth only in upper third of leaf; rhizoidal tubers red, crimson to red-brown9
- 9 Leaves narrowly ovate and acuminate, somewhat keeled near apex; margin mostly entire; upper laminal cells elongate and sublinear (4–6: 1); tubers red to orange (8:) **7. R. leptothrix**
- 9: Leaves acute, ovate to obovate; upper margin usually serrulate to serrate; upper laminal cells short and broad (2–4: 1); tubers red, crimson or brown 10
- 10 Dioicous; tubers dark brown or red-brown, concolorous with rhizoids; leaves usually distinctly spirally twisted; capsules mostly brownish, generally horizontal or suberect; endostome segments gradually acuminate into a projection (9:) **4. R. capillare**
- 10: Polyioicous; tubers bright red or crimson; leaves contorted but rarely spirally twisted; capsules often bright red, nutant; endostome segments rounded and abruptly apiculate..... **12. R. torquescens**

- 11 Leaves appressed to stem, imbricate, not much contorted when dry, concave; upper and middle laminal cells walls firm to distinctly incrassate (6:):..... 12
- 11: Leaves variously contorted when dry, not imbricate, usually not concave; upper and middle laminal cells thin to firm-walled, rarely incrassate..... 14
- 12 Upper leaf margin with an very broad border (> 4 layers of cells), finely crenulate; rhizoidal tubers present (11):..... [R. **perlimbatum**]
- 12: Upper leaf margin with a narrow border, or border \pm absent, distinctly serrate; rhizoidal tubers absent. 13
- 13 Plants golden or brown-green; hairpoint long, straight, golden-brown (12:) 3. R. **campylothecium**
- 13: Plants red-green; hairpoint very short as a recurved mucro 8. R. **microrhodon**
- 14 Stems distinctly rosulate, short; lower leaves smaller than upper leaves (11:):..... 15
- 14: Stems elongate, not distinctly rosulate, with equidistant leaves occasionally crowded and enlarged at the apex..... 16
- 15 Upper leaf border > 4 cells wide, strong, often hyaline; leaves mostly elongate-spathulate; setae usually hooked at capsule base (in > 80% of sporophytes) (14):..... 11. R. **subtomentosum**
- 15: Upper leaf border 1–3 cells wide, not hyaline, often indistinct; leaves mostly obovate; setae rarely hooked at base of capsule (< 20%)..... 2. R. **billarderi**
- 16 Leaves strongly keeled (when moist or dry), elongate, ovate-lanceolate to spatulate (14:):..... 10. R. **subfasciculatum**
- 16: Leaves flat, broadly ovate to spatulate 17
- 17 Upper leaf border 4 or more cells wide, often hyaline; leaves elongate-spathulate; gametangia not conspicuously enlarged; old leaves and stems often blackish; capsule mouth straight; tubers present (16:):..... 11. R. **subtomentosum**
- 17: Upper leaf border 1 or 2 cells wide, often indistinct, never hyaline; leaves mostly ovate; gametangia conspicuously enlarged; plants remaining green or brownish green; capsule mouth oblique; tubers absent 14. R. **wightii**

1. *Rosulabryum albolimbatum* (Hampe) J.R.Spence, *Bryologist* 99: 223 (1996)

Rhodobryum albolimbatum Hampe, *Linnaea* 36: 517 (1870); *Bryum albolimbatum* (Hampe) A.Jaeger, *Ber. Tätigk. St. Gallischen Naturwiss. Ges.* 1873–74: 191 (1875). T: Porongorups, W.A., Oct. 1867, *F.Mueller*; holo: BM.

Bryum pusillum Broth., *Oefvers Förh. Finska Vetensk.-Soc.* 33: 11, 12 (1890), *nom. illeg.* (later homonym); *Rhodobryum pusillum* Paris, *Index. Bryol.* 1119 (1898). T: Helidon, Qld, Dec. 1888, *C.Wild* 9; holo: H-BR; iso: BRI.

Illustrations: H.Ochi, *J. Fac. Educ. Tottori Univ. Nat. Sci.* 21: 49, fig. 30H–J (1970), as *B. capillare*; H.Syed, *Bryologist* 77: 305, fig. 21; 306, fig. 22 (1973), as *B. albolimbatum*; D.G.Catcheside, *Mosses of South Australia* 261, fig. 151 (1980), as *B. albolimbatum*.

Dioicous. Plants in loose tufts, 5–15 mm tall, deep green to reddish green. Rhizoids brown, finely papillose. Leaves soft, obovate-spathulate or ovate, 1.5–3.5 mm long, clustered in rosettes, reduced below, flat, little-altered when dry, slightly twisted; margin coarsely serrate at least in the uppermost 25–35% of the leaf; costa brown, excurrent; border of 3 or 4 rows of narrow elongate cells; upper laminal cells rhomboidal to hexagonal, short and narrow, 30–60 \times 12–20 μ m, thin-walled, rarely porose; basal cells rectangular, 40–100 \times 15–22 μ m, porose. Gemmae as globose or oval orange tubers, 250–400 μ m across; superficial cells not protruding; filamentous gemmae in leaf axils, pale brown, papillose, 15–35 μ m long.

Perichaetial leaves narrow, lanceolate; margin coarsely dentate; costa excurrent. Setae 10–20 mm long, straight. Capsules nodding to inclined, subcylindrical, 2–4 mm long. Spores 12–16 μ m diam. Chromosome number not known.

A widespread, endemic species in W.A., S.A., Qld, N.S.W. and Vic.; grows on soil or, more commonly, on wood or rock in moist, often shaded habitats.

W.A.: Two Peoples Bay Nature Reserve, *J.R.Spence 4180* (NSW). S.A.: Hindmarsh Valley, *D.G.Catcheside 53.283* (AD). Qld: Nandroya Falls, Palmerston North Natl Park, *I.G.Stone 24847* (MEL); Bunya Mtns, *F.M.Bailey 184, 187* (BRI). N.S.W.: Rous, Richmond R., *W.W.Watts 1312* (NSW).

Although placed into synonymy with *R. capillare* by Ochi (1970), *R. albolimbatum* was recognised as a distinct species by Syed (1973). It can be distinguished by the rosulate stems, coarsely serrate leaves near the apex which are shrunken and contorted but not spirally twisted when dry, and by the presence of filamentous gemmae in the leaf axils. It appears to be related to South American and South African species such as *R. andicola* (Hook.) Ochyra.

2. *Rosulabryum billarderi* (Schwägr.) J.R.Spence, *Bryologist* 99: 223 (1996)

Bryum billarderi Schwägr., *Sp. Musc. Frond.*, Suppl. 1, 2: 115 (1816). T: Tas., locality unknown, *J.-J.H. de Labillardière*, *fide* Ochi (1970); *n.v.*, type lost, *fide* Mohamed (1979).

Bryum leptothecium Taylor, *Phytologist* 1: 1094 (1844); *Rhodobryum leptothecium* (Taylor) Paris, *Index Bryol.* 1117 (1898). T: locality unknown; *n.v.*

Bryum robustum Hampe, *Linnaea* 28: 205 (1856); *Rhodobryum robustum* (Hampe) Paris, *Index Bryol.* 1120 (1898). T: "Australia felix", *F.Mueller*; holo: BM; iso: MEL.

Bryum rufescens Hook.f. & Wilson, in J.D.Hooker, *Fl. Tasman.* 2: 192 (1859), *nom. illeg.* (later homonym). T: Hobarton [Hobart], Tas., *R.C.Gunn 1691*; syn: BM; near Risdon, Tas., *J.D.Hooker*; syn: *n.v.*

Bryum rufescens Hook.f. & Wilson var. *brevifolium* Wilson, in J.D.Hooker, *Fl. Tasman.* 2: 192 (1859). T: by the seaside, Point Esperance, Penquite, Tas., *R.C.Gunn 1556*; syn: *n.v.*; *A.F.Oldfield 334*; syn: BM.

Bryum rufescens Hook.f. & Wilson var. *mamillatum* Wilson, in J.D.Hooker, *Fl. Tasman.* 2: 192 (1859). T: St. Patrick's River, Tas., *R.C.Gunn 1585*; holo: BM.

Rhodobryum breviramulosum Hampe, *Linnaea* 40: 311 (1876); *Bryum breviramulosum* (Hampe) Hampe, *Fragm.* 11 (Suppl.): 48 (1881). T: locality unknown; *n.v.*

Bryum viridulum Müll.Hal., *Hedwigia* 37: 104 (1898); *Rhodobryum viridulum* Paris, *Index Bryol.*, Suppl. 1: 301 (1900). T: Mt Dromedary, N.S.W., 1883, *Miss Bate*; syn: MEL; Sydney, N.S.W., 1881, *Rev. Dr Wools*; syn: MEL; Domina, N.S.W., *D.Kayser* [Herb. Geheeb 1876]; syn: *n.v.*

Bryum brachyaris Müll.Hal., *Trans. & Proc. Roy. Soc. Victoria* 19: 73 (1882). T: source of Yarra, Cardies R., Vic., Oct. 1873, *F.Mueller*; syn: *n.v.*; Apollo Bay, Vic., *F.Mueller 55*; syn: NSW.

Bryum aeruginosum Müll.Hal., *Hedwigia* 37: 95 (1898). T: Balls Head Bay, Sydney, N.S.W., Oct. 1884, *T.Whitelegge*; syn: MEL; isosyn: NSW; Double Bay, [Sydney, N.S.W.], July 1884, *T.Whitelegge*; syn: NSW.

Bryum abruptinervium Müll.Hal., *Hedwigia* 37: 102 (1898); *Rhodobryum abruptinervium* (Müll.Hal.) Paris, *Index Bryol.*, Suppl. 1: 298 (1900). T: Dimboola, Vic., July 1883, *F.M.Reader*; syn: MEL; Murrumbidgee, Vic., Aug. 1886, *F.M.Reader*; syn: MEL; isosyn: BM?, H-BR, NSW.

Bryum brunneidens Müll.Hal., *Hedwigia* 37: 105 (1898); *Rhodobryum brunneidens* (Müll.Hal.) Paris, *Index Bryol.*, Suppl. 1: 299 (1900). T: Genoa R., East Gippsland, Vic., 1881, *Witherhead*; holo: MEL *n.v.*

Bryum dobsonianum Müll.Hal., *Hedwigia* 37: 108 (1898); *Rhodobryum dobsonianum* (Müll.Hal.) Paris, *Index Bryol.*, Suppl. 1: 299 (1900). T: Dead Is., Tas., 1884, *Judge Dobson*; holo: MEL *n.v.*

Bryum ischyrrhodon Müll.Hal., *Hedwigia* 37: 103 (1898). T: Clarence R., N.S.W., Nov. 1875, *Wilcox*; holo: MEL; iso: H-BR.

Bryum pohliaeopsis Müll.Hal., *Hedwigia* 37: 107 (1898). T: Moyston, Vic., Oct. 1883, *D.Sullivan*; holo: S; iso: MEL, NSW.

Rhodobryum tasmanicum Paris, *Index Bryol.*, Suppl. 1: 301 (1900), *nom. illeg. incl. spec. prior.*; *n.v.*

Bryum globulare Hampe ex Müll.Hal., *Genera Musc. Frond.* 238 (1900). T: Novae Hollandiae, *coll. unknown*; holo: B.

Bryum crenatidens Müll.Hal., *Genera Musc. Frond.* 238 (1901), *nom. nud.* (in synonym). Based on: Cambewarra, N.S.W., Nov. 1885, *T.Whitelegge 332*; Cambewarra, N.S.W., Dec. 1885, *T.Whitelegge* (NSW).

Bryum madoricum Müll.Hal., in W.W.Watts & T.Whitelegge, *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 143 (1906), *nom. nud.* (in synonym). Based on: Dimboola, Vic., 10 Sept. 1897, *F.M.Reader* (MEL).

Bryum forsythii Broth., *Proc. Linn. Soc. New South Wales* 41: 592 (1916). T: Kiama, N.S.W., *W.Forsyth 384*; syn: H-BR; isosyn: NSW; *loc. id.*, *W.Forsyth 390*; syn: NSW.

Illustrations: H.Ochi, *J. Fac. Educ. Tottori Univ. Nat. Sci.* 21: 54, fig. 34; 56, fig. 35 (1970), as *Bryum robustum*; G.A.M.Scott & I.G.Stone, *The Mosses of Southern Australia* 279, pl. 51 (1976), as *Bryum billardierei*; R.D.Seppelt, *The Moss Flora of Macquarie Island* 113, fig. 44 (2004).

Dioicous. Plants in loose or dense tufts, green or yellow-green, 1–6 cm tall, simple or repeatedly branched, with a brown tomentum below. Rhizoids brown to reddish brown, densely papillose. Leaves distinctly rosulate with smaller leaves below, ovate or oblong to obovate,

±contorted when dry, imbricate, not spirally arranged around the stem, 1.5–5.0 (–6.0) mm long, 1.0–1.8 (–2.5) mm wide, widest 67–80% from base; margin distinctly toothed above, strongly recurved in lower three-quarters; border narrow, 1–3 cells wide, not hyaline; costa strong, excurrent, colourless above; upper laminal cells rhomboidal-hexagonal, 40–81 × 12–23 µm; basal cells ±broadly rectangular. Gemmae as rhizoidal tubers, scattered, sometimes abundant, produced on short rhizoids, orange to red, globose or oval, (300–) 500–1000 µm in widest axis, 10–25 cells across face; cells not projecting.

Setae 20–30 mm long, straight; perichaetia often polysetose. Capsules oval to cylindrical or oblong-cylindrical, with a distinct neck, horizontal to cernuous when dry, 3–6 mm long. Spores 15–20 µm diam. *n* = 10, *vide* H.P.Ramsay & J.R.Spence, *J. Hattori Bot. Lab.* 80: 261 (1996).

Widely distributed in all States and Territories except N.T.; grows on soil, wood or on soil over rock; common, especially in shaded habitats. A circum-temperate to subtropical species of the Southern Hemisphere, in Africa, Australasia, Malesia, Oceania, New Zealand and Macquarie Is.

W.A.: Porongurup Natl Park, 27 km N of Albany, *D.H.Norris* 26286 (BRI). S.A.: Eyre Penin., *L.D.Williams* 3657a (AD). Qld: Caboolture, *C.J.Wild* s.n. (BRI). N.S.W.: Yarrangobilly Caves, *W.W.Watts* 8744 (NSW). A.C.T.: Black Mtn, *J.Sawyer* 35 (BRI). Vic.: near Bogong, *D.G.Catcheside* 69,266 (AD). Tas.: Mt Barrow, *M.Tindale* s.n. (NSW).

Rosulabryum billarderi is closely related to *R. subtomentosum* from which it differs in the mostly obovate leaves with a narrow border and setae only very rarely hooked at the base of the capsules. By contrast, the leaves of *R. subtomentosum* are spatulate, with a broad, often hyaline border 4 or more cells wide and setae mostly hooked at the base of the capsules. This species differs from *R. subfasciculatum* which has more elongate stems and equidistant leaves that are crowded near the apex, but not distinctly rosulate.

This complex and variable species has many synonyms and it has been variously interpreted; Ochi (1970) took a broad view, unlike Mohamed (1979). We have adopted the latter approach, as combining the many unrelated species recognised from around the world by Ochi cannot be supported. More work is required on the group in Australia, especially the apparently distinct forms occurring in the mountains of north-eastern N.S.W. and south-eastern Qld.

3. *Rosulabryum campylothecium* (Taylor) J.R.Spence, *Bryologist* 99: 223 (1996)

Bryum campylothecium Taylor, *London J. Bot.* 5: 52 (1846); *Rhodobryum campylothecium* (Taylor) Paris, *Index Bryol.* 1115 (1897). T: Swan R., W.A., 1843, *J.Drummond*; holo: BM; iso: H. [Specimens at NSW, labelled “*sp. nov.* Perth” by Brotherus are possible isotypes.]

Bryum chlororhodon Müll.Hal., *Hedwigia* 37: 107 (1898). T: Dimboola, Vic., July 1896, *F.M.Reader* s.n.; lecto: MEL, *vide* J.R.Spence & H.P.Ramsay, *Fl. Australia* 51: 412 (2006); isolecto: MEL; Dimboola, Vic., July 1896, *F.M.Reader* 16; syn: NSW.

Bryum peraristatum Müll.Hal., *Hedwigia* 37: 106 (1898), *nom. illeg.* (later homonym); *Rhodobryum peraristatum* (Müll.Hal.) Paris, *Index Bryol.*, Suppl. 1: 300 (1900). T: Clarendon, Vic., *O.Tepper*; holo: MEL *n.v.*

Bryum pallenticoma Müll.Hal., *Hedwigia* 37: 100 (1898); *Rhodobryum pallenticoma* (Müll.Hal.) Paris, *Index Bryol.*, Suppl. 1: 300 (1900). T: Swan R., W.A., *L.Preiss*; *n.v.*

Bryum billarderi Schwägr. var. *cygnicollum* Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 128 (1906), *nom. nud.* (in synonym). Based on: Mt Lofty Ra., S.A., 1850, *F.Mueller* s.n. (MEL).

Illustrations: H.Ochi, *J. Fac. Educ. Tottori Univ. Nat. Sci.* 21: 51, fig. 32A–D (1970); D.G.Catcheside, *Mosses of South Australia* 264, fig. 153 (1980), both as *Bryum campylothecium*.

Dioicous. Plants loosely to densely tufted, usually 10–20 mm tall, yellowish green to bronze above, darker below. Stems stout, tomentose below. Rhizoids sparse, red-brown, coarsely papillose. Leaves ±comose, 2–3 mm long, closely imbricate in dense comal tufts, rather stiff and thick, spreading or patent when moist, scarcely altered when dry, tufted at shoot apices, broadly obovate, strongly concave; apex acute; marginal cells projecting as small blunt teeth in upper part, entire below, recurved for lower three-quarters of leaf, with a weak border of 2–4 longer narrower incrassate cells; costa excurrent in a long straight smooth or denticulate

hairpoint, golden-brown; upper laminal cells rhomboidal-hexagonal, 35–45 × 18–20 µm; walls incrassate; basal cells rectangular. Gemmae not known.

Setae 15–25 mm long, straight. Capsules horizontal or cernuous, clavate or oblong-pyriform, 1.5–2.5 mm long. Spores 16–20 µm diam. Chromosome number not known.

Occurs in W.A., S.A., N.S.W., A.C.T., Vic. and Tas.; grows on sandy soil in the open, especially in sand dunes and in mallee. Also in New Zealand and South America.

W.A.: Hampton Ra., 20 km E of Mundrabilla HS, Oct. 1979, *D.E.A. Catcheside* (AD). S.A.: Kangaroo Is., *E.M.Martin* 9.4 (AD). N.S.W.: The Gap, near Young, *W.W.Watts* 7723 (NSW). A.C.T.: Tidbinbilla, *H.Streimann* 70 (CANB). Vic.: Grampians Natl Park, *I.G.Stone* 2596 (MEL). Tas.: Kangaroo Pt, *W.A.Weymouth* 500 (NSW).

The species is characterised by the absence of tubers, leaves that are ovate, concave and imbricate, with a long hairpoint and a golden or yellow-green colour. It is closely related to *R. microrhodon* from Tasmania, but it differs in coloration, habitat, and the long hairpoint. Capsules are rare.

4. *Rosulabryum capillare* (Hedw.) J.R.Spence, *Bryologist* 99: 223 (1996)

Bryum capillare Hedw., *Sp. Musc. Frond.* 182 (1801). T: Europe; *n.v.*

Bryum immarginatum Broth., *Oefvers. Förh. Finska Vetensk.-Soc.* 35: 50 (1893). T: Mt Perry, Qld, *J.Keys s.n.*; syn: H-BR; *loc. id.*, *F.M.Bailey* 239; syn: H-BR.

Bryum plebejum Müll.Hal., *Hedwigia* 37: 94 (1898). T: Port Phillip, Vic., 1883, *French*; holo: MEL *n.v.*

Bryum luehmannianum Müll.Hal., *Hedwigia* 37: 100 (1898); *Rhodobryum luehmannianum* (Müll.Hal.) Paris, *Index Bryol.*, Suppl. 1: 300 (1900). T: Upper Yarra R., Fernshaw, Vic., Jan. 1881, *Luehmann s.n.*; holo: MEL.

Bryum microsporium Broth., *Oefvers. Förh. Finska Vetensk.-Soc.* 42: 116 (1899), *nom. illeg.* (later homonym). T: Masons Ck, Peppermint Bay, Tas., *W.A.Weymouth* 1848; holo: H-BR.

Bryum flaccidifolium Müll.Hal., *Genera Musc. Frond.* 238 (1901), *nom. nud.* (in synonym.). Based on: Rose Bay, N.S.W., 26 Aug. 1899, *W.Forsyth* 390; Lane Cove, N.S.W., 3 May 1899, *W.Forsyth* 39 (BM, NSW).

Bryum flaccidisetum Hampe ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 143 (1906), *nom. nud.* (in synonym.). Based on: hilly mallee country, NW of Dimboola, Wimmera, Vic., 26 June 1896, *F.M.Reader s.n.* (MEL, NSW).

Bryum erythropyxis Müll.Hal. var. *minus* Broth. ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 132 (1906). T: Newrybar, Brooklet and Pearces Ck, Richmond R., N.S.W., 1899, *W.W.Watts s.n.*; syn: NSW.

Bryum nanoides Müll.Hal. ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 143 (1906), *nom. nud.* (in synonym.). Based on: Dimboola, Vic., 22 July 1897, *F.M.Reader s.n.* (MEL).

Bryum nanotorquescens Müll.Hal. ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 143 (1906), *nud. nud.* (in synonym.). Based on: Dimboola, Vic., 26 July 1897, *F.M.Reader s.n.* (MEL).

Bryum sublonginervium Geh., in *W.W.Watts & T.Whitelegge, Proc. Linn. Soc. New South Wales* 30 (Suppl.): 143 (1906), *nom. nud.* (in synonym.). Based on: Cambewarra, N.S.W., 29 Sept. 1885, *C.Harris* 295 (NSW).

Illustrations: H.Ochi, *J. Fac. Educ. Tottori Univ. Nat. Sci.* 21: 48, figs 30, 31 (1970), as *B. capillare*; A.Eddy, *Handb. Malesian Mosses* 3: 129, fig. 415 (1996), as *B. capillare*; H.Streimann, *The Mosses of Norfolk Island* 28, fig. 9 (2002).

Dioicous. Plants in loose or dense tufts, 10–25 mm tall, usually dark green, scarcely glossy, soft, matted with brown to reddish brown papillose rhizoids below. Leaves shrunken, spirally twisted around stem and with flexuose apices when dry, erect-spreading when moist, variable in size, to 3 mm long, obovate-spathulate, plane or concave, short-acuminate, abruptly aristate from the costa; margin entire below, usually finely serrulate to, occasionally, serrate above, recurved to about half-way or more; costa percurrent to short-excurrent; hairpoint filiform, concolorous with costa, straight or bent; upper laminal cells hexagonal or rhomboidal-hexagonal, 35–50 × 15–25 µm, thin-walled; cells longer and narrower and in 2–4 rows at margin, usually with hyaline walls; basal cells long-rectangular. Gemmae as rhizoidal tubers, reddish brown, globose or ovoid, 60–250 µm wide, the outer cell walls not projecting. Setae 20–30 mm long, reddish, sometimes curved above. Capsules cernuous, horizontal to pendent, cylindrical to pyriform, 1.5–3.0 mm long, pale brown to brown.

Exostome teeth oblong-lanceolate, yellow with a hyaline border. Spores 8–12 µm diam. $n = 20$, *vide* H.P.Ramsay, *Austral. J. Bot.* 22: 311 (1974), as *Bryum billarderi*.

Occurs in all States and Territories; grows on soil and sand or on shaded rocks and trees. Also in northern Europe, Africa, North, Central and northern South America, East Asia, Lord Howe Is., Norfolk Is. and New Zealand.

W.A.: Margaret R., *A.C.Beauglehole 14378* (MEL). N.T.: Mt Giles, *P.K.Latz 6614b p.p.* (AD). S.A.: Port Gemein, *I.G.Stone 6049* (MEL). Qld: Malanda, *H.Streimann 16854* (CANB). N.S.W.: Jenolan Caves, *A.J.Downing 5810* (NSW). A.C.T.: Australian Natl Botanic Gardens, Canberra, *H.Streimann 48999* (CANB). Vic.: Aireys Inlet, *R.D.Seppelt 3960* (MEL). Tas.: St. Patricks Head, *W.A.Weymouth 2652* (CANB).

Rosulabryum capillare and *R. torquescens* are somewhat similar, but they can be distinguished by the colour of the rhizoids, rhizoidal gemmae and leaves. Plants of *R. capillare* are dioicous, rhizoidal gemmae are brown to red-brown with concolorous rhizoids, and the leaves tend to be spirally twisted around the stem. By contrast, *R. torquescens* is synoicous (rarely autoicous or dioicous), rhizoidal gemmae are crimson or orange with brown-red rhizoids, and the leaves are contorted but rarely spirally twisted.

Filamentous gemmae have been reported occasionally for *R. capillare*.

5. *Rosulabryum epiphyticum* J.R.Spence & H.P.Ramsay, *Telopea* 8: 325 (1999)

T: Port Macquarie, N.S.W., 8 Aug. 1991, *A.J.Downing s.n.*; holotype: BRI; isotype: NSW.

Illustration: J.R.Spence & H.P.Ramsay, *op. cit.* 327, fig. 1.

Dioicous. Plants loosely tufted, to 5 mm tall, green, becoming golden-brown with age. Stems sparingly branched by subfloral innovations, sparsely tomentose, with equidistant leaves. Rhizoids pale brown to orange-brown, coarsely papillose. Leaves ovate to obovate, contorted when dry, erect-spreading when moist, 1–2 mm long, bright green, becoming golden with age; margin entire to slightly serrulate in upper part, plane; border lacking or weak and with a single layer of narrow elongate thick-walled cells; costa percurrent to short-excurrent as a stout point to 150 µm long, brown, often somewhat toothed; upper and mid-laminal cells rhomboidal, 35–90 × 10–20 µm (3–4: 1), becoming longer (to 100 µm) and regularly rectangular below; innovation leaves similar but somewhat smaller. Gemmae mostly unbranched, filiform, in axils of upper leaves on sterile stems, brownish, coarsely papillose; rhizoidal tubers red-brown, occasional on long rhizoids in substratum, globose, 200–250 µm wide; cells 12–25 µm across, the walls not projecting.

Setae 20–25 mm long. Capsules inclined to nutant, narrowly clavate to cylindrical, 2–3 mm long, brown; mouth broad. Spores smooth, 12–15 µm diam. $n = 11$, *vide* H.P.Ramsay & J.R.Spence, *J. Hattori Bot. Lab.* 80: 262 (1996), as “*Rosulabryum* nov. sp.”.

A rare, endemic species in the coastal ranges of eastern Qld and north-eastern N.S.W.; usually on the twigs of trees and shrubs and on orchid roots; sometimes on rocks in rainforest.

Qld: Downey Ck, Innisfail, *I.G.Stone 24701* (MEL); Riflebird Ck, Binna Burra, *I.G.Stone 12919* (MEL); Expedition Ra., *I.G.Stone 121181* (MEL); Mt Haig, *I.G.Stone 22260* (MEL); Stairway Falls, Lamington Natl Park, *I.G.Stone 11998* (MEL).

Rosulabryum epiphyticum is a distinctive species in a habitat that is unique for the genus. The stems with ovate equidistant leaves, the percurrent or very short-excurrent costae and filiform gemmae in the leaf axils are diagnostic.

6. *Rosulabryum lamingtonicum* J.R.Spence & H.P.Ramsay, *Telopea* 8: 328 (1999)

T: Cedar Creek Natl Park, Tambourine Mtn, Qld, *A.Mertens 3*; holotype: BRI; isotype: NSW.

Illustration: J.R.Spence & H.P.Ramsay, *op. cit.* 331, fig. 3.

Dioicous. Plants small, tufted; young shoots bright green, darkening with age. Stems 5–10 mm tall, sparingly rhizomatous, unbranched or sparingly branched by subfloral innovations, with dimorphic leaves. Rhizoids reddish brown, finely papillose. Rosette leaves dark olive-green with red tints, ovate to spatulate, contorted when dry or often spreading and flattened,

spreading when moist, strongly keeled, not decurrent, 2–3 mm long; margin serrate, with large colourless teeth confined to upper half of lamina; border weak or absent below; costa strong at base, narrowing above and not reaching apex to percurrent, colourless above, reddish below, often with a small apiculus; upper and middle laminal cells irregularly rhomboidal, 45–75 × 12–20 μm (2–3: 1), becoming longer and more rectangular below. Sterile innovation leaves equidistant, not rosulate, broadly ovate to obovate, 1–2 mm long, bright green, decurrent; margin strongly serrate, with hyaline teeth often reaching the leaf base, teeth often at right angles to border; costa not reaching leaf apex, colourless; laminal cells as in rosette leaves. Gemmae filamentous, in small clumps, with ±smooth walls, short, mostly unbranched; rhizoidal tubers red-brown, highly variable, irregularly globose, 100–500 μm wide.

Inner perigonal leaves smaller than outer leaves, broadly ovate, apiculate; perichaetial leaves narrower. Setae long-exserted, 18–20 mm long. Capsules clavate to pyriform, somewhat inclined, 1.0–2.5 mm long, brown. Spores 15–25 μm diam. Chromosome number not known.

An endemic, mainly corticolous species in eastern Qld and north-eastern N.S.W.

Qld: track to Mt Hobwee, Lamington Natl Park, *J.R.Spence 5192* (NSW); W side of Mt Hobwee, *J.R.Spence 5191a* (NSW); near turnoff to Millaa Millaa Falls, *H.P.Ramsay R225* (NSW); Hugh Nelson Ra., *H.Streimann 57742* (CANB). N.S.W.: Whian Whian State Forest, *I.G.Stone 1391* (MEL).

The broadly ovate to spatulate, keeled and strongly serrate leaves are very similar to those of *R. subfasciculatum*, but the serrations are more distinct and extend to mid-leaf in *R. lamingtonicum*. Moreover, the rhizoidal gemmae are red to orange-red in *R. subfasciculatum* but brownish in *R. lamingtonicum*. The small size and the rosulate, fertile stems suggest an affinity with *R. capillare* or *R. leptothrix*, while the filamentous gemmae are similar to those of *R. albolimbatum* and *R. epiphyticum*.

7. Rosulabryum leptothrix (Müll.Hal.) J.R.Spence, *Bryologist* 99: 223 (1996)

Bryum leptothrix Müll.Hal., *Hedwigia* 37: 94 (1898). T: Trinity Bay, [Cairns], Qld, *Karsten*; holo: MEL? [not located]; iso: H-BR.

Illustration: H.Ochi, *J. Fac. Educ. Tottori Univ. Nat. Sci.* 21: 47, fig. 29 (1970), as *Bryum leptothrix*.

Dioicous. Plants small, green. Stems 10–20 mm long, solitary or in open tufts, sparsely branched. Rhizoids sparse, pale brown to red-brown, papillose. Leaves spirally twisted around stem when dry, erect-spreading when moist, narrowly obovate to ovate, acuminate, 1–3 mm long; margin finely serrulate near apex; border weak; costa slender, excurrent; upper laminal cells elongate, sublinear, mostly < 80 μm long (4–6: 1); lower cells more regularly rectangular. Gemmae as rhizoidal tubers, 100–200 μm wide, globose, red to orange; cell walls not projecting. Capsules not seen. Chromosome number not known.

An endemic species in Qld, N.S.W. and Vic.; grows on soil or soil-covered rock ledges in seasonally arid regions.

Qld: Mungana, *W.L.Leafe [I.G.Stone 16742]* (MEL); Crediton State Forest, 16 km SW of Finch Hatton, *H.Streimann 37684* (CANB). N.S.W.: Gloucester R., *H.Streimann 6469* (CANB); Nightcap Natl Park, *I.G.Stone 25976, 25977* (MEL). Vic.: Chimney Pot picnic area, Grampians Natl Park, *J.R.Spence 4370* (NSW).

Rosulabryum leptothrix is characterised by its narrow, small to medium-sized leaves that are spirally twisted around the stem when dry, elongate upper and middle laminal cells and a weak, predominantly entire border. It is probably closest to the subcosmopolitan *R. capillare*.

8. Rosulabryum microrhodon (Müll.Hal.) J.R.Spence, *Bryologist* 99: 223 (1996)

Bryum microrhodon Müll.Hal., *Hedwigia* 37: 108 (1898); *Rhodobryum microrhodon* Paris, *Index Bryol.* 1118 (1898), *nom. nud.* T: St. Crispins Ck, Mt Wellington, Tas., 1890, *W.A.Weymouth 522, 523*; syn: CANB (*Weymouth 522*), HO; Kangaroo Pt, Tas., 1890, *W.A.Weymouth*; syn: H, S *n.v.*

Illustrations: M.A.Haji Mohamed, *Bryologist* 10: 448, fig. 24 (1979), as *Bryum microrhodon*; H.Ochi, *J. Fac. Educ. Tottori Univ. Nat. Sci.* 21: 57, fig. 36a–e (1970), as *Bryum billardieri p.p.*

Dioicous. Plants densely to loosely tufted, 5–20 mm tall, green above, reddish below; lower part of stem sometimes lacking leaves or with loose reddish tomentum. Rhizoids reddish brown to reddish purple, coarsely papillose. Leaves small, imbricate, sometimes in a small compact coma, mostly concave, carinate, 2.5–3.5 mm long, obovate, widest 50–67% from the base, not contorted when dry, green tinged with red at base; margin serrate; border narrow, of 1–3 cell layers, \pm absent above; costa short-excurrent in a recurved arista, golden-green to red-green; upper laminal cells short-hexagonal or rhomboidal, $16\text{--}25 \times 25\text{--}45 \mu\text{m}$ (2–3: 1); walls firm to distinctly incrassate. Gemmae absent.

Perichaetial leaves tinged with red, lanceolate, cuspidate; margin plane to crenulate above, recurved below; costa long-excurrent in an arista. Setae 14–29 mm long. Capsules oblong to clavate, horizontal to cernuous when dry, cernuous to pendulous when moist, 2.3–4.0 mm long; mouth large; neck narrow. Spores 11–13 μm diam. Chromosome number not known.

Occurs in subalpine Tas., mainly on soil and rock, sometimes on wood. Also in the South Island of New Zealand.

Tas.: Falls Track area, Hartz Mtns, *J.R.Spence 4585* (NSW); Ben Lomond Natl Park, *J.R.Spence 4672* (NSW).

This species is closely related to *R. campylotheicum* which also has concave, imbricate leaves. However, *R. microrhodon* has a very short, recurved arista, and it tends to have a bright red-green colour. *Rosulabryum campylotheicum* has a long straight hairpoint and is golden-brown. The latter is usually found at low elevations in temperate Australia.

Rosulabryum microrhodon was placed into synonymy with *Bryum billarderi* by Sainsbury (1955) and Ochi (1970), but it was accepted as a distinct species by Mohamed (1979). Previously considered an Australian endemic, *B. microrhodon* has recently been collected at high elevations in north-west Nelson, in the South Island of New Zealand (Spence, unpublished data).

9. *Rosulabryum queenslandicum* J.R.Spence & H.P.Ramsay, *Telopea* 8: 326 (1999)

T: track to Aljon Falls, Carnarvon Gorge Natl Park, Qld, 2 Jan. 1993, *J.R.Spence 5167*; holotype: BRI.

Illustration: J.R.Spence & H.P.Ramsay, *op. cit.* 329, fig. 2.

Dioicous. Plants small, to 5 mm tall, visible as bright green shoots sometimes mixed with other mosses. Stems unbranched or with a few subfloral innovations, often leafy throughout, sparsely tomentose. Rhizoids pale brown, papillose. Leaves crowded into a rosette on fertile stems, smaller below; sterile innovations with equidistant leaves; leaves narrowly ovate to obovate, 0.5–1.5 mm long, contorted when dry, erect-spreading when moist; margin plane, entire throughout or, rarely, finely serrulate above, unbordered; costa variable, golden-brown, not reaching apex to short-excurrent in a stout mucro; apiculus present if costa not excurrent; upper and middle laminal cells irregularly rhomboidal, $35\text{--}50 \times 12\text{--}18 \mu\text{m}$ (2–3: 1), becoming longer and more rectangular below. Gemmae as small irregularly globose elliptical or pyriform rhizoidal tubers, often present on long rhizoids in substratum, reddish brown or orange-brown, darker than rhizoids, 50–150 μm wide; cells 25–50 μm wide; filamentous gemmae absent.

Perigonal and perichaetial leaves crowded; inner leaves smaller than outer, ovate-lanceolate to triangular, with strongly bordered margins, serrulate above; innermost leaves very small, broadly ovate to obovate. Setae 5–8 mm long. Capsules cylindrical, inclined, c. 2 mm long, brownish, wider than urn at mouth. Spores 8–13 μm diam. Chromosome number not known.

A very rare, endemic species known from one locality in N.T. and three in Qld, found on soil banks in shaded areas.

N.T.: 3.2 km NE of Mt Ziel trig. station, *A.C.Beauglehole 27344* (MEL). Qld: Mt Nebo, *I.G.Stone 13132* (MEL); Blackdown, *I.G.Stone 20226* (MEL).

Superficially, *R. queenslandicum* resembles *Gemmabryum radiculosum*. However, it can be distinguished by the leaf shape, leaf margin and border and the shape of the capsules. The former has mostly ovate to obovate leaves that are \pm entire, a plane border and elongate-cylindrical capsules with a wide mouth. By contrast, *G. radiculosum* and its allies have

ovate-lanceolate leaves, serrate upper leaf margins, strongly revolute borders and pyriform capsules with mouths that are narrower than the urn.

10. Rosulabryum subfasciculatum (Hampe) J.R.Spence, *Bryologist* 99: 223 (1996)

Rhodobryum subfasciculatum Hampe, *Linnaea* 40: 312 (1876); *Bryum subfasciculatum* (Hampe) Mitt., *Trans. & Proc. Roy. Soc. Victoria* 19: 73 (1882). T: Qld, locality unknown, *Eaves*; holo: BM; iso: H.

Bryum subleptothecium Müll.Hal., *Rev. Bryol.* 3: 3 (1876), *nom. nud.* Based on: near Sydney, N.S.W., *D.Kayser* (NSW).

Bryum dilatatomarginatum Müll.Hal., *Hedwigia* 37: 102 (1898); *Rhodobryum dilatatomarginatum* (Müll.Hal.) Paris, *Index Bryol.*, Suppl. 1: 299 (1900). T: Cambewarra, N.S.W., Dec. 1885, [*T.Whitelegge*]; holo: H-BR; iso: NSW, S.

Bryum subolivaceum Müll.Hal., *Hedwigia* 37: 103 (1898); *Rhodobryum subolivaceum* (Müll.Hal.) Paris, *Index Bryol.*, Suppl. 1: 300 (1900). T: The Clyde, N.S.W., Oct. 1884, *W.Baeuerlen*; holo: MEL *n.v.*

Bryum amoenum Wright ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 126 (1906), *nom. nud.* (in synon.). Based on: Tintenbar, Richmond R., Ballina District, N.S.W., *W.Baeuerlen 1613* (NSW).

Bryum subviolaceum Müll.Hal. ex F.M.Bailey, *Compr. Cat. Queensland Pl.* 662 (1913), *nom. nud.*, *error. pro B. subolivaceum* Müll.Hal.

Bryum leucoloma Broth., *Proc. Linn. Soc. New South Wales* 60: 93 (1935), *nom. nud.* (in synon.). Based on: Shellharbour, N.S.W., 1 Oct. 1899, *E.Cheel 408* (NSW).

Bryum chrysophyllum Ochi, *Hikobia* 6: 220 (1973). T: “in locis paludosis montis Coumboui, loco dicto Dent Saint-Vincent”, New Caledonia, *Balansa 2977*; holo: *n.v.*

Illustrations: M.A.Haji Mohamed, *J. Bryol.* 10: 445, fig. 22; 446, fig. 23 (1979), as *Bryum billardierei* var. *platyloma*.

Dioicous. Plants loose or tufted, 1–5 cm tall, yellowish green or green, lustrous in upper parts, with a brown tomentum below. Stems simple or, occasionally, branched by 1 or 2 subperichaetial innovations, usually erect, sometimes flexuose. Rhizoids brown to reddish brown, coarsely papillose. Leaves usually rather distantly arranged on stem, only forming a distinct rosette when surrounding perichaetia, not twisted, sometimes spreading, keeled; upper leaves often folded lengthwise, ovate or obovate to lanceolate, 2.3–6.6 mm long (3–4: 1), widest 50–67% from the base; apex mucronate to cuspidate; margin distinctly serrate in upper 25–50% of leaf, the lower half reflexed or plane; border moderately distinct, with 2 or 3 rows of elongate cells, yellowish in older leaves; costa short- or moderately excurrent, reddish below, yellowish green above; upper laminal cells elongate-rhomboidal, occasionally hexagonal, 50–80 × 13–17 µm; cell walls thin to firm but not distinctly incrassate; basal cells rectangular. Gemmae on short rhizoids, pale red to orange-red, scattered, round or oval, 180–530 µm wide; filamentous gemmae absent.

Setae 15–35 mm long. Capsules horizontal to cernuous when dry, pendulous when moist, symmetrical, clavate-pyriform, 4–6 mm long, contracted below mouth when dry. Spores 10–15 µm diam. *n* = 10, *fide* H.P.Ramsay & J.R.Spence, *J.Hattori Bot. Lab.* 80: 262 (1996).

Occurs in W.A., S.A., Qld, N.S.W., Vic. and Tas.; grows mainly on soil, in sand dunes or on the forest floor. Also in New Caledonia.

W.A.: Chudalup, *I.G.Stone 6325* (MEL). Qld: Big Tableland, S of Cooktown, *H.Streimann 30728* (CANB). N.S.W.: ‘Kingwell’, Wyong, *W.W.Watts 9772* (NSW). Vic.: Hedditch waterhole, Winnup to Dartmoor, *I.G.Stone s.n.* (MEL). Tas.: Ettrick R., King Is., *L.D.Cameron 616* (MEL).

Rosulabryum subfasciculatum has often been confused with *R. billardierei*; however, it can be distinguished by the non-rosulate stems with leaves that are equidistant although somewhat tufted above, smaller tubers and more ovate-lanceolate and carinate leaves with margins that are more strongly serrate above.

11. *Rosulabryum subtomentosum* (Hampe) J.R.Spence, *Bryologist* 99: 223 (1996)

Rhodobryum subtomentosum Hampe, *Linnaea* 36: 516 (1870); *Bryum subtomentosum* (Hampe) Mitt., *Trans. & Proc. Roy. Soc. Victoria* 19: 73 (1822). T: Vic., [locality not known], *F.Mueller* 56; holo: BM; iso: H, NSW.

Bryum platyloma Schwägr., *Sp. Musc. Frond.*, Suppl. 1, 2: 116 (1816); *Bryum billarderi* Schwägr. var. *platyloma* Mohamed, *J. Bryol.* 10: 412 (1979). T: Cascade Creek, Eglinton, South Island, New Zealand, May 1971, *J.Child* 2713; neo: GL; isoneo: BM, JC.

[*Bryum perlimbatum* auct. non Cardot: H.Streimann & A.Touw, *J. Hattori Bot. Lab.* 49: 262 (1981)]

Illustrations: M.A.Haji Mohamed, *J. Bryol.* 10: 413, fig. 5 (1979), as *Bryum billarderi* var. *platyloma*; J.R.Spence & H.P.Ramsay, *J. Adelaide Bot. Gard.* 17: 111, fig. 2 (1996), as *R. subfasciculatum*.

Dioicous. Plants tufted, to 2 cm tall, or sometimes with elongate sparingly branched pendent stems to 10 cm long; older parts of stems becoming denuded of leaves; older stems and leaves often blackish. Rhizoids brown to reddish brown, densely papillose. Leaves often spreading, rarely concave, contorted when dry, erect-spreading when moist, spatulate, 4–6 mm long; apex acute; margin distinctly toothed above, strongly recurved in lower three-quarters; border whitish, broad, with 4–8 rows of narrow elongate incrassate cells; costa moderately to long-excurrent, golden or brown-green; upper laminal cells rhomboidal-hexagonal, 40–80 × 12–20 µm; basal cells ±broadly rectangular. Gemmae as rhizoidal tubers, scattered, sometimes abundant, produced on short rhizoids, orange to red, globose or oval, (300–) 500–1000 µm in longest axis, with 10–25 cells across face; cell walls not projecting.

Setae 20–40 mm long, usually bent into a hook below the capsule. Capsules suberect to horizontal when dry, cernuous to pendulous when moist, often incurved, symmetrical, long-cylindrical or narrowly oblong, 2.5–6.5 mm long, contracted below the large mouth when dry. Spores 12–16 µm diam. *n* = 10, *fide* H.P.Ramsay & J.R.Spence, *J. Hattori Bot. Lab.* 80: 261 (1996).

Occurs in W.A., S.A., Qld, N.S.W., Vic. and Tas.; commonly found on splashed rocks along streams or near waterfalls, especially at higher elevations. Also widespread in New Zealand and its offshore islands.

W.A.: Cascades, near Pemberton, *D.G.Catcheside* 74.179 (AD). S.A.: S of Ashbourne, 23 Sept. 1978, *D.E.A.Catcheside* (AD). Qld: Toowoomba, *F.M.Bailey s.n.* (BRI). N.S.W.: Crackenback R., 6 km NW of Jindabyne, *H.Streimann* 3962 (NSW). Vic.: near Chimney Pots, Grampians Natl Park, *J.R.Spence* 4366 (NSW). Tas.: Liffey Falls, *J.R.Spence* 4691 (NSW).

Although this species is closely related to *R. billarderi*, a suite of distinguishing characters readily separate them. These include a thicker leaf border in *R. subtomentosum* (4–8 as opposed to 1 or 2 layers) thus giving a whitish edge to the spatulate rather than obovate leaves. The setae are hooked just below the capsules in about 90% of *R. subtomentosum* collections (Mohamed, 1979), but only in 10–20% of *R. billarderi* specimens.

12. *Rosulabryum torquescens* (Bruch ex De Not.) J.R.Spence, *Bryologist* 99: 223 (1996)

Bryum torquescens Bruch ex De Not., *Syll.* 163 (1838); *Bryum capillare* Hedw. subsp. *torquescens* (Bruch ex De Not.) Kindb., *Eur. N. Amer. Bryin.* 2: 358 (1897). T: Sardinia, Italy, 1828, *C.Müller*; *n.v.*

Bryum pyrothecium Müll.Hal. & Hampe, *Linnaea* 26: 495 (1855); *Rhodobryum pyrothecium* (Müll.Hal. & Hampe) Paris, *Index Bryol.* 1119 (1898). T: Moe Swamp, Vic., *F.Mueller*; holo: MEL.

Bryum erythroxyxis Müll.Hal., *Hedwigia* 37: 101 (1898); *Rhodobryum erythroxyxis* (Müll.Hal.) Paris, *Index Bryol.*, Suppl. 1: 299 (1900). T: Hume R., N.S.W., *F.M.Campbell*; syn: MEL; Cambewarra, N.S.W., Dec. 1885, *T.Whitelegge*; syn: H-BR, NSW.

Bryum erythroxyxis Müll.Hal. var. *minor* Broth. ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 132 (1906), *nom. nud.* Based on: Newrybar, Brooklet and Pearces Ck, Richmond R., N.S.W., Dec. 1899, *W.W.Watts* (NSW).

Bryum synoicum Müll.Hal., *Hedwigia* 37: 96 (1898). T: Bells Head [Balls Head] Bay, N.S.W., Aug. 1884, *T.Whitelegge*; syn: MEL; isosyn: NSW; Randwick Rd, [Sydney, N.S.W.], Sept. 1884, *T.Whitelegge*; syn: MEL; Bunya Mtns, Qld, May 1885, *F.M.Bailey*; syn: H-BR; isosyn: MEL; S.A., [locality not known], *F.M.Campbell*; syn: H-BR.

Bryum subtorquescens Geh., in *W.W.Watts & T.Whitelegge*, *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 140, 141 (1906), *nom. nud.* (in synon.). Based on: Cambewarra, N.S.W., 29 Sept. 1885, *C.Harris* (MEL).

Illustrations: H.Syed, *Bryologist* 77: 308, fig. 23; 309, fig. 24 (1973), as *B. torquescens*; D.G.Catcheside, *Mosses of South Australia* 258, fig. 148 (1980), as *B. torquescens*.

Polyoicous. Plants in loose or dense tufts, 10–25 mm tall, green to reddish green. Rhizoids bright red to brown, finely papillose. Leaves plane or concave, ovate, obovate or spatulate, mucronate or cuspidate, scarcely shrinking, slightly twisted or spreading to closely appressed when dry, spirally twisted around the stem, erect-spreading when moist; margin recurved, bordered, toothed (sometimes strongly); costa strongly excurrent in a mucronate to piliferous hairpoint, brown to red; upper laminal cells narrowly hexagonal, 30–55 × 13–22 µm (2–3: 1); basal cells narrowly rectangular; marginal rows elongate, incrassate, forming a distinct border. Gemmae rhizoidal, globose, 75–255 µm diam., red or orange, on long and short rhizoids; cell walls usually not projecting; filamentous axillary gemmae absent.

Setae 20–40 mm long. Capsules cernuous or subpendulous, symmetrical, subcylindrical to cylindrical, 3–5 mm long, red or reddish brown; mouth often red. Endostome segments abruptly apiculate, with rounded shoulders. Spores 11–15 µm diam. $n = 20$, *vide* H.P.Ramsay & J.R.Spence, *J. Hattori Bot. Lab.* 80: 262 (1996).

Occurs in W.A., S.A., N.S.W., A.C.T., Vic. and Tas.; a ±cosmopolitan species in semi-arid and seasonal temperate and subtropical regions.

W.A.: 56 km SSE of Carnamah, *A.C.Beauglehole 14167* (MEL). S.A.: Murray R., near Coomandook, *L.D.Williams 1031* (AD). N.S.W.: Warrumbungle Ra., *W.Forsyth 1023* (NSW). A.C.T.: Molongolo Gorge, *J.R.Spence 4490* (NSW). Vic.: Buninyong, Sept. 1898, *R.A.Bastow* (MEL). Tas.: Kangaroo Pt, *A.J.Taylor 778* (MEL).

Australian collections include many dioicous or perhaps rhizautoicous forms. If not synoicous, *R. torquescens* can be confused with *R. capillare*, but it differs in having red capsules, bright red rather than reddish brown rhizoidal gemmae, paler rhizoids and a longer leaf hairpoint. The leaves are generally contorted but not spirally twisted as in *R. capillare*, and the upper margins are more strongly serrate. In Australia, this species is far more common than *R. capillare*.

13. Rosulabryum tuberosum (Mohamed & Damanhuri) J.R.Spence, *Bryologist* 99: 223 (1996)

Bryum tuberosum Mohamed & Damanhuri, *Bryologist* 93: 288 (1990). T: Genting Highlands, Pahang, Malaysia, *M.A.Hadji Mohamed 5397*; holotype: KLU; isotype: UKMB.

Illustration: M.A.Hadji Mohamed & A.Damanhuri, *op. cit.* 289, fig. 1 (1990), as *Bryum tuberosum*.

Dioicous. Plants small to medium-sized, 5–10 mm tall, loosely tufted, green to reddish green, reddish when older, radiculose at base. Rhizoids reddish brown to brown. Leaves shrunken and contorted when dry, erect-spreading when moist, sometimes forming a terminal rosette, broadly to narrowly ovate, 2–3 mm long, acuminate; apex short-mucronate; margin entire; border weak, of 3 or 4 rows of elongate cells; costa slender, percurrent to short-excurrent as a slender point; upper laminal cells elongate-rhomboidal to hexagonal, 65–125 × 10–20 µm; basal cells long-rectangular, 40–105 µm long (3–4: 1). Gemmae as rhizoidal tubers, abundant, reddish brown, from macronemata arising in leaf axils or on rhizoids, flattened with undulate margins due to wall shrinkage on drying, 3–7 cells across face. Sporophytes not present in Australian collections.

Known from two localities in north-eastern Qld; possibly introduced. Also in Malaysia and New Guinea (J.R.Spence, unpublished data).

Qld: Crystal Cascades, Mt Spec, near Townsville, *I.G.Stone 16751* (MEL); Dunk Is., *I.G.Stone s.n.* (MEL).

The elongate laminal cells, ovate leaves and very unusual tubers are diagnostic. The tubers are very different from those of other Australasian species, being flattened and often originating in the leaf axils as well as on rhizoids. The affinities of this species are not known.

14. Rosulabryum wightii (Mitt.) J.R.Spence, *Bryologist* 99: 223 (1996)

Bryum wightii Mitt., *J. Proc. Linn. Soc., Bot.*, Suppl. 1: 74 (1859). T: southern India; holo: BM.

Bryum semperlaxum Müll.Hal., *Linnaea* 38: 582 (1874); *Brachymenium semperlaxum* (Müll.Hal.) A.Jaeger, *Ber. Tätigk. St. Gallischen Naturwiss. Ges.* 1873–74: 114 (1875) (Ad. 1: 576). T: Brisbane R., Qld, Oct. 1867?, A.Dietrich; holo: n.v.

Illustrations: H.C.Gangulee, *Mosses of Eastern India and Adjacent Regions* 2: 984, fig. 475 (1974); M.A.Haji Mohamed, *J. Bryol.* 12: 24, fig. 1 (1982), both as *Bryum wightii*.

Dioicous. Plants robust, densely tufted, green above, reddish below. Stems erect, to 10 cm tall, branched by several subperichaetial innovations, red, tomentose below. Rhizoids red. Leaves equidistant along stem or somewhat smaller and more distant below and larger above and more crowded at apex, erecto-patent to erect-spreading, curled and crispate when dry, erect-spreading when moist, mostly ovate, rarely oblong to oblong-spathulate, concave, 5–9 mm long, 1–2 mm wide; older leaves reddish; apex acute; lower margin reflexed and entire, flat and dentate near apex; border moderately distinct, 1 or 2 rows of narrow elongated cells; costa brown, strongly excurrent in a short stout denticulate arista; upper laminal cells slightly thickened, rhomboidal, to 80 µm long (3–4: 1); lower cells rectangular and more elongate, with thinner walls. Gemmae absent. Perigonial leaves greatly enlarged in a comal tuft, similar in shape to vegetative leaves. Setae 20–30 mm long, erect, arcuate at tip, often polysetose, brown. Capsules large, clavate, 5–7 mm long, arcuate; mouth wide, usually oblique. Spores 12–18 µm diam. Chromosome number not known. Fig. 500–V.

Montane to alpine in eastern Qld, N.S.W. and Vic. Also in India.

Qld: Powelltown, 12 Dec. 1929, *J.H.Willis s.n.* (MEL, NSW); Elinjaa Falls, *I.G.Stone* 24276, 24277 (MEL). N.S.W.: Gloucester R., 28 km WSW of Gloucester, *H.Streimann* 6469 (CANB). Vic.: Mt Baw Baw, *R.A.Bastow s.n.* (MEL).

Rosulabryum wightii is a robust species that is often larger than *Rhodobryum aubertii*. Although the two can be confused, *R. wightii* has much enlarged gametangia, a well-developed stereid band in the costa, and the leaves hydrate rather quickly. Although very close to the south Indian type specimen, there are some subtle differences between specimens from across its range which warrant further study.