

## DISTICHOPHYLLUM<sup>1</sup>

Heinar Streimann†

*Distichophyllum* Dozy & Molk., *Musc. Frond. Ined. Archip. Ind.* 99 (1846); from the Greek *stichos* (a row) with the prefix *di-* (two of) and *phyllon* (a leaf), in reference to the differentiated dorsal and ventral leaves found in most species.

Type: Not designated.

Autoicous, dioicous, rarely synoicous. Plants small to medium-sized, usually creeping, the stems sparingly branched. Leaves symmetrical, heterophyllous, mostly complanate, weakly dimorphic, crowded, ovate to spatulate; apex rounded, cuspidate; base narrowed; margin usually entire, or weakly toothed or crenate; costa thin, single, reddish brown, extending to mid-leaf or to below the apex. Laminal cells lacking papillae, usually with a prominent border of elongate cells; upper cells isodiametric,  $\pm$ hexagonal; basal cells longer. Rhizoids common on the stem, reddish, darkening with age.

Perigonia and perichaetia axillary. Calyptra mitrate, split, glabrous or the apex with erect hairs; base finely fringed. Seta smooth or papillose, lateral. Capsules erect to pendulous, ovoid-cylindrical; annulus absent; operculum conical-rostrate. Peristome double, bent inwards; exostome teeth linear-lanceolate, paler above, transversely striolate, lower section darker, with a broad median furrow, split in the proximal two-thirds, but these can remain linked by cross strands; endostome segments as long as the teeth, hyaline, finely papillose; basal membrane high. Spores smooth to granulate, 7–15  $\mu$ m diam.

*Distichophyllum*, one of the largest genera in the Hookeriaceae, comprises about 100 tropical to subtropical species. Tropical Asia and the Pacific are centres of diversity, with about 65 species. Six species are known from mainland Australia, while *D. longicuspis* Broth. (not treated further here) is endemic to Lord Howe Island.

Most Australian species have smooth setae and are referable to sect. *Distichophyllum*. Only *D. mittenii* and *D. cuspidatum* have the distal parts of the seta slightly papillose; these are included in sect. *Mniadelphus*.

### References

- Ho, B.C., Tan, B.C. & Nathi, Y. (2010), New and noteworthy records of *Distichophyllum* (Daltoniaceae, Bryopsida) and allied genera in Asia and Australasia, *Tropical Bryol.* 31: 106–122.
- Lin, P.-J. & Tan, B.C. (1995), Contributions to the bryoflora of China (12): A taxonomic revision of Chinese Hookeriaceae (Musci), *Harvard Pap. Bot.* 7: 25–68.
- Scott, G.A.M. & Stone, I.G. (1976), *The Mosses of Southern Australia* 388–391.
- Streimann, H. (1999), Taxonomic studies on Australian Hookeriaceae (Musci). 2. The genera *Distichophyllum* and *Bryobrothera*, *J. Hattori Bot. Lab.* 86: 89–119.
- Townsend, C.C. (1982), Notes on mosses from Ceylon and India, 6. An illustrated key to *Distichophyllum* in Ceylon and S. India, *J. Bryol.* 12: 15–21.

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<sup>1</sup> Now in the Daltoniaceae [Goffinet, B., Buck, W.R. & Shaw, A.J. (2012), *Classification of the Bryophyta*. <http://www.eeb.uconn.edu/people/goffinet/Classificationmosses.html>].

Cite as: H.Streimann, *Australian Mosses Online. 11. Hookeriaceae: Distichophyllum*. [http://www.anbg.gov.au/abrs/Mosses\\_Online/Distichophyllum.pdf](http://www.anbg.gov.au/abrs/Mosses_Online/Distichophyllum.pdf) (2012)

## Key

- 1 Leaves lacking a border ..... **3. D. microcarpum**  
**1:** Leaves with a border of long narrow cells ..... 2  
**2** Leaf border 1 row of cells wide near the apex ..... **4. D. mittenii**  
**2:** Leaf border (2–) 3 or 4 rows of cells wide near the apex ..... 3  
**3** Leaf apices rounded, often with a small apiculus ..... **5. D. pulchellum**  
**3:** Leaf apices acute, with a short or long apiculus ..... 4  
**4** Apiculus 150–400 µm long ..... **2. D. cuspidatus**  
**4** Apiculus short or rudimentary, rarely 150 µm long ..... 5  
**5** Leaves oblong-oval to oblanceolate, crisped; apices elongate, acute; margin usually entire, rarely weakly toothed ..... **1. D. crispulum**  
**5:** Leaves ovate-orbicular, generally twisted and curled; apices short, stoutly apiculate; margin usually toothed, rarely entire ..... **6. D. rotundifolium**

### **1. Distichophyllum crispulum** (Hook.f. & Wilson) Mitt., *Trans. & Proc. Roy. Soc. Victoria* 19: 77 (1882)

*Hookeria crispula* Hook.f. & Wilson, *London J. Bot.* 3: 550 (1844); *Mniadelphus crispulus* (Hook.f. & Wilson) Müll.Hal., *Syn. Musc. Frond.* 2: 25 (1850). T: Bay of Islands, New Zealand, Aug. 1841, J.D.Hooker; holo: BM; iso: BM

*Mniadelphus baileyi* Müll.Hal. ex Kindb., *Enum. Bryin. Exot.* 101 (1891), *nom. nud.*; *Mniadelphus baileyi* Müll.Hal. ex Paris, *Index Bryol.* 821 (1897), *nom. nud.*

*Distichophyllum baileyianum* Müll.Hal., *Hedwigia* 41: 123 (1902). T: Helidon, Qld, 1883, *F.M.Bailey 105*; lecto: BRI, *fide* H.Streimann, *J. Hattori Bot. Lab.* 86: 92 (1999).

*Distichophyllum minutifolium* Müll.Hal., *Hedwigia* 41: 123 (1902). T: near Lilydale, N.S.W., Sept. 1891, *T.Whitelegge*; lecto: H, *fide* H.Streimann, *loc. cit.*

*Distichophyllum subflexuosum* Broth. ex Burges, *Proc. Linn. Soc. New South Wales* 60: 93 (1935), *nom. nud.*

Illustrations: J.Beever, K.W.Allison & J.Child, *Mosses of New Zealand*, 2nd edn 131 (1992); H.Streimann, *op. cit.* 93, fig. 1; H.Streimann, *The Mosses of Norfolk Island* 96, fig. 44 (2002); D.Meagher & B.Fuhrer, *A Field Guide to the Mosses and Allied Plants of Southern Australia* 37 (2003)

Dioicous. Plants small, prostrate, 10–15 mm long, dull green to dark green, rarely branched. Leaves complanate, crisped, straighter when moist, oblanceolate to oblong-oval, 1.1–2.4 mm long, 0.50–0.75 mm wide, generally strongly apiculate; margin entire or distantly irregular or slightly distantly denticulate; costa reddish brown, extending to c. three-quarters of the leaf length, narrow, c. 3 cells wide, 25–35 µm at the base. Laminal cells thin-walled to moderately thick-walled; upper and median cells hexagonal to hexagonal-rounded, 12–20 × 8–10 µm, smaller towards the margin; basal cells at mid-leaf rectangular to hexagonal, 26–50 × 13–20 µm, narrower nearer the margin; border narrow, 2 or 3 cells wide, extending from base to apiculus, the cells to 100 µm long. Rhizoids sparse, branched, reddish brown, darker with age, sparingly papillose, to 2.5 mm long and to 50 µm wide; cells to 75–100 (–340 µm) long.

Perigonal leaves linear to lanceolate, 0.55–0.75 mm long, 0.13–0.20 mm wide, ecostate; margin entire. Laminal cells hexagonal 50–67 × 13–20 µm, shorter above, more rectangular below; border indistinct, 1 cell wide. Antheridia c. 10 per perigonium, 150–250 µm long; paraphyses very rare, 180–200 × 10–12 µm, hyaline; cells c. 25 µm long. Inner perichaetial leaves at the base of the capsule lanceolate to ovate-acuminate, 1.0–1.2 mm long, 0.40–0.55 mm wide; margin distantly denticulate; costa absent or very weak, hyaline, to half the leaf length, 1 cell wide, the cells narrowly rectangular. Laminal cells hexagonal, 62–75 (–115) × 12–17 µm; basal cells more rectangular, 30–50 × 13–17 µm; border narrow, 1 or 2 cells wide. Calyptra smooth, cream-coloured with a black tip, 1.2–1.3 mm long. Seta smooth, 9–11 mm long. Capsules pendulous, 0.85–1.00 mm long; operculum 0.5–0.7 mm long, erect to suberect. Peristome: exostome teeth c. 250 µm long; endostome segments 180–230 µm long. Spores 9–13 µm diam.

Known from eastern Qld, eastern and south-eastern N.S.W. and Vic.; occurs in tropical and temperate rainforest, wet-sclerophyll forests, generally in shaded moist areas, and especially on tree ferns, rocks, rotting wood, tree roots, and creek and earth banks. Also on Norfolk Island and in New Zealand.

Qld: Mt Bellenden Ker, 23 km SSE of Gordonvale, *H.Streimann 27436* (CANB, L); Dawes Ra., Kroombit S.F., 53 km E of Biloela, *H.Streimann 52479* (CANB). N.S.W.: Brindle Ck, Wiangaroo S.F., [Border Ranges Natl Park], 27 km NNE of Kyogle, *H.Streimann 6071* (CANB, L); Higgins Ck, 19 km NE of Batemans Bay, *H.Streimann 5778* (CANB, L, MO). Vic.: Stanley Ck, Howes Ra., *J.H.Willis s.n.* (MEL).

Most fertile collections were seen in May–August.

## 2. *Distichophyllum cuspidatum* (Dozy & Molk.) Dozy & Molk., *Musc. Frond. Ined. Archip. Ind.* 101 (1846)

*Hookeria cuspidata* Dozy & Molk., *Ann. Sci. Nat., Bot.*, sér. 3, 2: 305 (1844). T: Java and Sumatra, [Indonesia], *Zippelius & Korthals*; syn: *L.n.v.*

Illustrations: H.Mohamed & H.Robinson, *Smithsonian Contr. Bot.* 80: 20 (1991); H.Streimann, *op. cit.* 97, fig. 3.

Synoicous, autoicous. Plants medium-sized, prostrate, to 20 mm long and 6 mm wide, dark green above, yellowish below, glossy, sparingly branched. Leaves laterally compressed on the stem in a dorsiventral arrangement, not complanate, irregularly to spirally twisted when dry, flat, erect-spreading when moist, oblong-ellipsoidal to oblanceolate, 2.0–2.4 mm long, 0.60–0.65 mm wide, abruptly contracted to a subulate acumen (150–) 350–400 (–450)  $\mu\text{m}$  long, formed by long narrow marginal cells; margin entire; base revolute; costa 65–75% of the leaf length, c. 45  $\mu\text{m}$  wide at the base. Upper and median laminal cells moderately thick-walled, rounded-hexagonal, 12–20  $\mu\text{m}$  wide; basal cells thin-walled, irregularly rectangular, to 67  $\times$  25  $\mu\text{m}$ ; cells adjacent to the border more irregular, slightly smaller; border conspicuous, 2–4 rows wide, the cells narrowly elongate. Rhizoids often common, sparingly papillose, to 1.5 mm long, 15–25  $\mu\text{m}$  wide; cells 110–150  $\mu\text{m}$  long.

Inner perichaetial leaves oval; outer leaves longer, narrower, acuminate. Calyptra smooth, cucullate. Seta smooth, rarely slightly papillose above, 5–7 mm long, curved above. Capsules erect to inclined, ovoid, c. 1.0  $\times$  0.3 mm; operculum 0.7–0.8 mm long. Peristome teeth c. 240  $\mu\text{m}$  long, papillose; endostome segments densely papillose. Spores finely papillose, 8–15  $\mu\text{m}$  diam.

Known from one locality in north-eastern Qld where it was probably collected from rotting wood. Also in Sri Lanka, Thailand, Malaysia, China, Taiwan, the Philippines, Indonesia, Papua New Guinea, New Caledonia and the Society Islands.

Qld: K-tree Rd, between Cardwell and Innisfail, *I.G.Stone 24485* (MELU).

Distal and median cells are similar, appearing regular and occupying about three-quarters of the leaf length. By contrast, the longer basal cells clearly comprise a much smaller portion of the overall leaf.

## 3. *Distichophyllum microcarpum* (Hedw.) Mitt., *Trans. & Proc. Roy. Soc. Victoria* 19: 77 (1882)

*Hypnum microcarpon* Hedw., *Sp. Musc. Frond.* 244 (1801); *Pterygophyllum microcarpum* (Hedw.) Brid., *Musc. Recent. Suppl.* 4: 149 (1819); *Hookeria microcarpa* (Hedw.) Hook. & Grev., *Edinburgh J. Sci.* 2: 226 (1825); *Mniadelphus microcarpus* (Hedw.) Müll.Hal., *Linnaea* 21: 196 (1848). T: “Insulae Australis”, holo: G, *n.v.*

*Hookeria complanata* Hampe, *Linnaea* 40: 320 (1876); *Pterygophyllum complanatum* (Hampe) A.Jaeger, *Ber. Thätigk. St. Gallischen Naturwiss. Ges.* 1875–76: 342 (1877) [Ad. 2: 246]. T: ‘Johanne River’ [Johnson R.], Qld; holo: BM; iso: MEL.

*Hookeria subrotunda* Hampe, *Linnaea* 40: 320 (1876); *Pterygophyllum subrotundum* (Hampe) A.Jaeger, *Ber. Thätigk. St. Gallischen Naturwiss. Ges.* 1875–76: 342 (1877) [Ad. 2: 246]; *Mniadelphus subrotundus* (Hampe) Müll.Hal. ex M.Fleisch., *Hedwigia* 63: 214 (1922). T: Mount Dissaipointement [Disappointment, Vic.]; holo: BM; iso: MEL.

*Pterygophyllum levieri* Geh., *Rev. Bryol.* 8: 26 (1881); *Distichophyllum levieri* (Geh.) Broth., in H.G.A. Engler & K.A.E. Prantl, *Nat. Pflanzenfam.* I, 3: 930 (1907). T: Mt Wellington, Tas.; *n.v.*

Illustrations: J. Beever, K.W. Allison, J. Child, *Mosses of New Zealand*, 2nd edn 131 (1992); H. Streimann, *op. cit.* 102, fig. 7.

Dioicous. Plants medium-sized to robust, pale green to yellow-green. Stems to 5 cm long, sparingly branched from the base; branches often erect. Stems and branches complanate, densely foliate, variously weakly wrinkled when dry, straight when moist. Leaves distichous, imbricate, spatulate, 1.8–3.2 mm long, 0.8–1.7 mm wide; apex rounded; base narrow; margin entire to regularly crenate above, distantly at the base; costa prominent, occupying more than three-quarters of the leaf length, 2 or 3 cells wide, 40–60  $\mu\text{m}$  wide at the base. Laminal cells moderately thick-walled; upper cells irregularly quadrate, rounded or hexagonal to shortly irregularly rectangular, to 15–27  $\times$  14–16  $\mu\text{m}$ , slightly smaller and quadrate at the margin; median cells similar, obliquely angled, to 30  $\times$  16  $\mu\text{m}$ ; juxtacostal cells larger; basal juxtacostal cells thin-walled, rectangular to hexagonal, to 90  $\times$  30  $\mu\text{m}$ , nearer the margin to 30  $\times$  10  $\mu\text{m}$ , shorter along the margin; border absent. Rhizoids moderately dense on lower stems, short-branched, papillose, to 10 mm long, to 15  $\mu\text{m}$  wide; cells opaque, 180–220  $\mu\text{m}$  long.

Perigonia axillary, elongate. Perigonal leaves oblong-lanceolate, c. 1.25 mm long and 0.55 mm wide, ecostate; margin weakly and distantly toothed. Laminal cells rhomboidal, c. 75  $\times$  25  $\mu\text{m}$ ; basal cells more rectangular. Antheridia c. 10 per perigonium, 450–500  $\times$  45–50  $\mu\text{m}$ ; paraphyses hyaline, sparse, c. 0.7 mm long and 10  $\mu\text{m}$  wide. Perichaetia ovate. Perichaetial leaves broadly elliptical, c. 1.3 mm long and 0.8 mm wide, ecostate, acute to obtuse; base broad; margin entire. Laminal cells elongate-hexagonal, c. 62  $\times$  15  $\mu\text{m}$ ; marginal cells rectangular, narrower, not forming a border. Calyptra 1.0–1.2 mm long. Seta 3–10 mm long, smooth. Capsules dark purplish, inclined or erect, ovoid, 0.5–1.0 mm long; operculum to 1.2 mm long, conical, with an erect beak. Peristome: exostome teeth yellowish brown, c. 400  $\mu\text{m}$  tall, c. 70  $\mu\text{m}$  wide at the base; endostome segments clear, smooth. Spores opaque, 10–12  $\mu\text{m}$  diam.

Known from south-eastern S.A., south-eastern Qld, south-eastern N.S.W., A.C.T., Vic. and Tas.; grows on rock (including limestone), soil, creek banks, tree fern logs and at the bases of shrubs. Also in New Zealand.

S.A.: Hindmarsh Valley Falls, *D.G. Catcheside 53.273* (AD, MEL). Qld: Lamington Natl Park, *I.G. Stone 4220, 4229* (MELU). N.S.W.: Erlington Ck, Tallaganda S.F., 17 km WSW of Braidwood, *H. Streimann 37835* (B, CANB, NY); Stony Ck, *H. Streimann 45230* (CANB, NY). A.C.T.: Tidbinbilla Nature Reserve, *H. Streimann 9275* (CANB, L). Vic.: near Point Hicks, *H. Streimann 39654* (CANB, CHR, NY). Tas.: 'German Town', 5 km NNE of St Marys, *J.A. Curnow 2461* (CANB).

The main period of capsule formation is August–January, with a lull in December.

The large, hyaline mid-leaf cells are quite prominent and give the leaves a whitish appearance.

#### 4. *Distichophyllum mittenii* Bosch & Sande Lac., *Bryol. Javan.* 2: 25, 149 (1861)

T: Java, [Indonesia], *Teysmann, Holle & Amann*; syn: *L n.v.*

Illustrations: H. Mohamed & H. Robinson, *Smithonian Contr. Bot.* 80: 24 (1991); P.-J. Lin & B.C. Tan, *Harvard Pap. Bot.* 7: 61 (1995); H. Streimann, *op. cit.* 105, fig. 9.

Autoicous. Plants medium-sized, often robust, yellowish to dull green, prostrate. Stems to 4 cm long, simple or branched. Leaves complanate, slightly wrinkled to moderately crisped when dry, straight when moist, spatulate to obovate, 2.0–2.8 mm long, 1.0–1.2 mm wide, broadly rounded above, with a small apiculus; base narrow; margin entire, undulate; costa strong, occupying c. 75–80% of the leaf length, 3 indistinct cells wide, c. 25  $\mu\text{m}$  wide at the base. Laminal cells hexagonal to polygonal, thick-walled; submarginal cells in the distal half smaller, 12–18  $\times$  10–15  $\mu\text{m}$ , extending to mid-leaf, nearer the middle 20–25  $\times$  17–20  $\mu\text{m}$ ; median cells 37–50 (–70)  $\times$  27–35  $\mu\text{m}$ ; juxtacostal cells larger; basal cells rectangular to elongate-hexagonal, 62–116 (–138)  $\times$  22–26  $\mu\text{m}$ ; border narrow, 1 cell wide above, 2 cells

below. Rhizoids reddish brown, smooth to slightly papillose when older, to 180 µm long, 12–20 µm wide; cells c. 130 µm long.

Perigonia small, bud-like, numerous. Perigonal leaves oval; apiculus small; outer leaves larger than inner, ecostate. Perichaetial leaves broader; apiculus smaller and broader. Calyptra scabrous. Seta 7–9 mm long, papillose. Capsules dark brown, 0.7–0.8 mm long, inclined, ovoid to ovoid-oblong, strongly papillose; operculum c. 0.8 mm long. Peristome: exostome teeth thin, hyaline; endostome segments scarcely papillose; basal membrane one-third the height of the teeth. Spores ±smooth, 7–9 µm diam.

Occurs in north-eastern Qld; also in Sri Lanka, Thailand, Malaysia, Indonesia, the Philippines, China, Taiwan, Papua New Guinea, New Caledonia and Vanuatu.

Qld: Danbulla Forest Drive, near Atherton, *G.H.Bell 658* (AD); Kirrima, *I.G.Stone 16487* (MELU).

This species is characterised by the narrow, 1 cell wide upper border (2 cells wide near the base), the exceptionally narrow base, juxtacostal cells being larger than the marginal and apical cells, and the very small apiculus.

##### **5. *Distichophyllum pulchellum* (Hampe) Mitt., *Trans. & Proc. Roy. Soc. Victoria* 19: 77 (1882)**

*Mniadelphus pulchellus* Hampe, *Syn.* 2: 23 (1851). T: Auckland Islands, *J.D.Hooker*; syn: BM.

*Hookeria amblyophylla* Hook.f. & Wilson, in *J.D.Hooker, Fl. Nov.-Zel.* 2: 123 (1854); *Mniadelphus amblyophyllus* (Hook.f. & Wilson) A.Jaeger, *Ber. Thätigk. St. Gallischen Naturwiss. Ges.* 1875–76: 320 (1877) [Ad. 2: 224]; *Distichophyllum amblyophyllum* (Hook.f. & Wilson) Mitt., *Trans. & Proc. Roy. Soc. Victoria* 19: 77 (1882). T: Port Nicholson, North Island, New Zealand, *A.Sinclair*; Auckland, New Zealand, *C.Knight*; syn: BM.

*Hookeria sinuosa* Hook.f. & Wilson, in *J.D.Hooker, Fl. Tasman.* 2: 219 (1859); *Distichophyllum sinuosum* (Hook.f. & Wilson) Mitt., *Trans. & Proc. Roy. Soc. Victoria* 19: 77 (1882). T: “Arthur’s Lakes”, Tas., *R.C.Gunn*; Hobart, Tas., *A.F.Oldfield*; syn: BM; isosyn: BM, HO.

*Distichophyllum whiteleggeanum* Müll.Hal., *Hedwigia* 41: 123 (1902); *Mniadelphus whiteleggeanum* (Müll.Hal.) Müll.Hal. ex M.Fleisch., *Hedwigia* 63: 214 (1922). T: Fitzroy Falls, Moss Vale, N.S.W., 8 Nov. 1884, *T.Whitelegge*; lecto: MEL, *vide* H.Streimann, *J. Hattori Bot. Lab.* 86: 107 (1999); isolecto: BM, NSW.

*Mniadelphus subsinuosum* Müll.Hal. ex M.Fleisch., *Hedwigia* 63: 214 (1922), *nom. nud.*; *Distichophyllum subsinuosum* Müll.Hal. ex M.Fleisch., *Hedwigia* 63: 214 (1922), *nom. nud.*

Illustrations: G.O.K.Sainsbury, *Bull. Roy. Soc. New Zealand* 5: 400 (1955); D.J.Catcheside, *Mosses of South Australia* 300, fig. 181 (1980); H.Streimann, *op. cit.* 108, fig. 11; D.Meagher & B.Fuhrer, *A Field Guide to the Mosses and Allied Plants of Southern Australia* 37 (2003).

Dioicous. Plants medium-sized, forming dense prostrate mats, yellow-green to pale green, or with some leaves reddish. Stems to 4 (–5) cm long, flattened; branches few. Leaves undulate and crisped when dry, ±straight when moist, spatulate, obovate to oval, 1.0–1.6 mm long, 0.5–1.0 mm wide; apex rounded, often with a small apiculus (occasionally to 50 µm long); margin entire, plane, often reflexed at the apex; costa extending to three-quarters of the leaf length, thin, c. 3 cells wide, c. 20 µm wide at the base. Laminal cells thin- to moderately thick-walled; upper cells irregularly quadrate to hexagonal, 8–17 (–20) × 7–14 µm; median cells irregularly hexagonal, 15–25 × 10–14 µm, smaller near the border; basal cells irregularly rectangular to hexagonal, to 37 (–63) × 13 µm; border of 2 or 3 rows of narrow elongate ±hyaline cells. Rhizoids smooth, often scattered and twisted, to 20 mm long, 15–30 µm wide; cells 100–180 µm long, obscure in older sections.

Perigonia gemmiform. Perichaetial leaves broadly elliptic, c. 1 mm long and 0.5 mm wide; costa absent or very weak. Laminal cells large, lax. Calyptra 2.0–2.5 mm long, mitrate, with a subscabrid apex. Seta reddish, 10–30 mm long, slightly twisted. Capsules reddish brown, horizontal to cernuous, 1.0–2.5 mm long; annulus narrow or lacking, adhering to the fragile 0.5–0.8 mm long operculum. Peristome teeth yellow, 290–350 µm long; basal membrane c. one-third the height of the teeth; endostome segments smooth, as high as the teeth, split between articulations. Spores granulose, 9–12 µm diam.

Known from south-eastern S.A., eastern N.S.W., A.C.T., Vic. and Tas.; common on wet rock faces and near waterfalls and on the lower stems of tree ferns, on logs and on ground; occurs

in temperate rainforest and wet and dry sclerophyll forest. Also in Papua New Guinea, throughout New Zealand and on the Auckland Islands and Campbell Island.

S.A.: Waterfall Gully, Adelaide, *H.B.S. Womersley s.n.* (MEL). N.S.W.: New England Natl Park, 72 km E of Armidale, *H. Streimann 47776 (Musci Austral. Exs. 114)* (CANB); Stoney Ck, 34 km SE of Nowra, *H. Streimann 45231* (CANB, NY). A.C.T.: Brindabella Ra., 32 km SW of Canberra, *H. Streimann 5268* (CANB, L). Vic.: Result Ck, Bendoc–Orbost road, 13 km SW of Bendoc, *H. Streimann 36525* (CANB, NY). Tas.: Lune River Rd, 5 km SW of Lune, *J.A. Curnow 2708* (B, CANB, HO, NY).

The majority of collections and fertile specimens were from Tasmania, and most capsules were seen in November–April.

**6. *Distichophyllum rotundifolium* (Hook.f. & Wilson) Müll.Hal. & Broth., *Abh. Naturwiss. Vereine Bremen* 16(3): 506 (1900)**

*Hookeria rotundifolia* Hook.f. & Wilson, *London J. Bot.* 3: 551 (1844); *Mniadelphus rotundifolius* (Hook.f. & Wilson) Müll.Hal., *Syn. Musc. Frond.* 2: 21 (1850). T: Bay of Islands, New Zealand, *coll. unknown*; holo: BM.

*Mniadelphus beccarii* Hampe & Geh., *Rev. Bryol.* 8: 26 (1881); *Distichophyllum beccarii* (Hampe & Geh.) Paris, *Index Bryol.* 388 (1895). T: Mt Wellington, Tas.; *n.v.*

*Mniadelphus subminutifolius* Broth. & Geh., *Rev. Bryol.* 24: 77 (1897); *Distichophyllum subminutifolium* (Broth. & Geh.) Müll.Hal. ex M.Fleisch., *Hedwigia* 63: 214 (1922). T: Clyde Mountain, N.S.W., 1888, *W. Baiierlen 116*; lecto: MEL, *vide H. Streimann, J. Hattori Bot. Lab.* 86: 107 (1999).

*Distichophyllum fissidentoides* Müll.Hal., *Hedwigia* 41: 122 (1902). T: “Mossman’s Bay”, [Sydney], N.S.W., Sept. 1884, *T. Whitelegge*; lecto: H, *vide H. Streimann, loc. cit.*; isolecto: BM.

*Distichophyllum obliquomucronatum* Müll.Hal., *Hedwigia* 41: 122 (1902). T: Fern Tree Gully, Mt Wellington, Tas., 10 Feb. 1888, *W.A. Weymouth*; holo: *n.v.*; iso: H.

*Distichophyllum squarrosulum* Müll.Hal., *Hedwigia* 41: 122 (1902). T: Cambewarra, N.S.W., Dec. 1885, *T. Whitelegge*; holo: *n.v.*; iso: H.

Illustrations: J. Beever, K.W. Allison & J. Child, *Mosses of New Zealand*, 2nd edn 131 (1992); H. Streimann, *op. cit.* 112, fig. 13.

Dioicous. Plants small, branched, prostrate, 8–12 (–20) mm long, pale green to dull dark green. Leaves strongly crisped to twisted when dry, ±straight when moist, ovate-orbicular to ±rounded, 0.9–1.2 mm long, 0.45–0.58 mm wide; apiculus short, stout; margin plane, distantly serrate in the upper half; costa reddish brown, extending for (50–) 65–75% of the leaf length, c. 3 cells wide, 12–20 µm wide at the base. Laminal cells moderately thick-walled; upper and median cells hexagonal to irregularly hexagonal, 12–18 × 7–12 µm, more irregular towards the margin; basal cells oblong, 20–50 × 15–25 µm, narrowly rectangular and c. 50 × 10 µm nearer the margin; border 2 or 3 cells wide, often appearing wider at the base, with cells to 100 µm long. Rhizoids arising along the stem, smooth, c. 0.35 mm long, 12–25 µm wide; cells c. 160 µm long.

Perigonal leaves ovate to oblong, c. 700 µm long. Perichaetial leaves 0.85–1.10 mm long, 0.45–0.58 mm wide, ecostate, or the costa very weak; margin distantly and weakly dentate. Laminal cells hexagonal, 37–50 × 12–20 µm; median cells more irregular; basal cells more rectangular; border narrow, 1 or 2 cells wide, grading into median cells. Calyptra c. 1.5 mm long, the tip blackish and either smooth or with erect hairs. Seta smooth, 5.8–12.5 mm long. Capsules pendulous, dark brown, narrowly oblong to oblong-oval, 0.81–1.00 mm long; operculum erect, c. 0.45 mm long. Peristome: exostome teeth yellowish brown, lanceolate, 225–270 µm long, c. 50 µm wide at the base, striolate; ventral lamellae projecting laterally; endostome segments c. 180 µm long, hyaline. Spores ±smooth, (8–) 12–15 µm diam.

Known from south-eastern N.S.W., Vic. and Tas.; occurs in *Nothofagus* forest, temperate rainforest and wet-sclerophyll and disturbed forests; especially on wet rocks and logs. Also in New Zealand and Chile.

N.S.W.: Balls Head Bay, *T. Whitelegge 2708* (NSW); Mongarlowe R., 22 km SE of Braidwood, *H. Streimann 39547* (CANB, H). Vic.: Errinundra Rd, 24 km S of Bendoc, *J.A. Curnow 1784* (CANB); Grand Ridge–Mt Fatigue road, Strzelecki S.F., 13 km NE of Foster, *H. Streimann 51740 (Musci Austral. Exs. 269)* (CANB). Tas.: Gordon R., Macquarie Harbour, *T.B. Moore 53* (H, HO).

Fertile collections were scarce, and were usually seen in December and January.

Some collections can be difficult to identify when teeth are lacking, but the rounded and strongly curved leaves with a short stout apiculus are diagnostic. The leaves are often so strongly curled, especially in Tasmanian collections, that the reddish stems are visible in dried material. Moreover, the apiculus consists mainly of cells similar to those of the upper lamina, and not elongate marginal cells as in *D. crispulum*.