FISSIDENS SUBG. FISSIDENS SECT. FISSIDENS

Type: *F. bryoides* Hedw.

Small to moderately sized plants, usually terrestrial, some aquatic. Leaves with mostly small smooth laminal cells, limbate throughout except, sometimes, on small barren shoots; or the limbidium present only on the margins of vaginant laminae, occasionally only those of perichaetial leaves. Costa usually subpercurrent to percurrent, occasionally excurrent, usually *bryoides*-type. Setae smooth, usually terminal. Exothecial cells more than 40 around the periphery of the capsule. Peristome usually *bryoides*-type, occasionally a deviation e.g. elements of the *F. taylorii* complex.

All *Fissidens* species with a *bryoides*-type peristome are referable to this section; ten species (and additional varieties) are known from Australia.

This section is sometimes divided into subsections, *Fissidens* and *Pachylomidium*, the latter being sturdy aquatic plants with the limbidium in 2 or more layers. Some aquatic species are less robust, and many of the terrestrial species have a uni- to bistratose limbidium. Bruggeman-Nannenga (1978), reduced sect. *Pachylomidium* and *Semilimbidium* subsect. *Bryolimbidium* Norkett to synonymy with subsect. *Fissidens*. This was refined by Pursell (1988) who also suggested incorporation of sect. Heterocaulon Müll.Hal. wholly or in part.

To avoid misidentification, *F. zollingeri* is included in the following key to species, although it is now placed in sect. *Areofissidens* (*q.v.*).

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1 Limbidium present only on vaginant laminae; in dimorphic species usually confined to largest leaves of barren plants and perichaetial leaves of fertile shoots, occasionally absent 2

1: Limbidium present or partly present on all laminae except perhaps those of leaves of small barren plants 4

2 Vaginant laminae open; small leaves of sterile shoots strongly decurved; capsules curved, asymmetrical ..... **F. bifrons**

2: Vaginant laminae closed or partly open; small leaves of sterile shoots not decurved; capsules usually erect, symmetrical 3

3 Vegetative leaves 1.2–1.5 mm long; limbidium generally distinct; subaquatic on stream banks and exposed roots; sterile and fertile shoots not markedly different; perichaetia terminal ..... **F. diversifolius**

3: Vegetative leaves less than 1 mm long; limbidium often absent; terrestrial; sterile and fertile shoots markedly different; female shoots very short with much larger leaves mainly composed of vaginant laminae, often axillary (formerly sect. Heterocaulon) ..... **F. taylorii**

4 Vaginant laminae of vegetative and perichaetial leaves open 5

4: Vaginant laminae usually closed (except occasionally in fertile plants), joining on or near margin in vegetative leaves, rarely more open 6

5 Laminal cells opaque, c. 6 µm wide; limbidia of vaginant laminae becoming broad and intramarginal towards the base ..... **F. megalotis**

5: Laminal cells clear, 15–20 µm wide; limbidia of vaginant laminae strictly marginal ..... **F. beckettii**

6 Limbidium very imperfect, usually obsolete on dorsal and apical laminae of vegetative leaves; capsules asymmetrical ..... **F. curvatus *p.p.***

6: Limbidium complete or, occasionally, failing at the leaf apex and/or at the base of vaginant laminae; capsules symmetrical or asymmetrical 7

7 Laminal cells mostly 5–8 µm wide, markedly convex, dark, obscure 8

7: Laminal cells mostly more than 10 µm wide, ±plane, often clear 9

8 Plants large, usually aquatic; leaves more than 2 mm long; border very strong, multistratose ..... **F. rigidulus**

8: Plants small or medium, usually on damp ground; leaves less than 2 mm long; border unistratose (rarely absent or sporadic on apical and dorsal laminae) ..... **F. leptocladus**

[9 Axillary hyaline nodules very prominent on stems; synoicous; capsules erect, symmetrical, with fewer than 40 cells around the periphery; peristome *scariosus*-type ..... **F. zollingeri** (see sect. *Areofissidens*)**]**

9: Axillary nodules inconspicuous; not synoicous; capsules erect or curved, symmetrical or asymmetrical, with more than 40 cells around the periphery; peristome *bryoides*-type 10

10 Limbidium usually to the apex and fusing with the excurrent costa ..... **F. curvatus *p.p.***

10: Limbidium usually failing below the apex; costa often failing short of the apex 11

11 Leaves undulate/crisped when dry; limbidium in mid-leaf biseriate, unistratose (rarely bistratose), clear; dorsal lamina contracted to insertion or slightly decurrent ..... **F. dietrichiae**

11: Leaves scarcely altered when dry; limbidium in mid-leaf triseriate, bistratose or tristratose, opaque; dorsal lamina narrowed, failing below or with the border fused with the costa to insertion ..... **F. perangustus**

Fissidens beckettii Mitt., *J. Linn. Soc., Bot.* 13: 325 (1873)

T: Maanagalla, Central Province, Ceylon [Sri Lanka], *Beckett 9*; holo: NY.

Fissidens calodictyon Broth., *Öfvers. Förh. Finska Vetensk.-Soc.* 33: 94 (1891). T: Ashgrove [Brisbane], Qld, May 1888, *C.Wild 1*; holo: H-BR; iso: BRI (n.v.), NSW.

Illustrations: Z.Iwatsuki & T.Suzuki, *J. Hattori Bot. Lab.* 51: 461, fig. 32 (1982); H.Streimann, *Mosses of Norfolk Island* 77, fig. 32 (2002).

Dioicous or rhizautoicous. Plants dimorphic; sterile plants rare; axillary nodules weak. Leaves ±uniform, distant, to c. 15-jugate, lanceolate, to c. 0.5 mm long, incompletely bordered, often elimbate; apex narrowly acute and usually slightly retrorse. Costa strong, excurrent. Vaginant laminae 1/2–3/4 of the leaf length, open; dorsal lamina tapered to the

base or failing. Laminal cells rhombic to irregularly hexagonal, 15–30 × 11–20 µm, rectangular and up to 40 µm long basally in vaginant laminae.

Male plants gemmiform, c. 0.85 mm tall. Fertile plants 0.5–2.0 mm tall, c. 1 mm wide. Leaves 3–4-jugate, 0.75–1.20 mm long, 0.23–0.35 mm wide. Limbidium complete in perichaetial leaves, fused with the costa at the apex, uniseriate to biseriate, unistratose to bistratose, much wider in vaginant laminae; margin ±entire. Calyptra conical, c. 0 5 mm long. Setae 3.5–6.0 mm long. Capsules asymmetrical, inclined; theca 0.4–0.5 mm long, 0.35–0.40 mm wide; exothecial cells irregular in size, oblong to quadrate, thin-walled; operculum rostellate, c. 0.4 mm long. Spores 13–20 µm diam., spiculose.

Occurs in central and south-east Qld, N.S.W., A.C.T. and Norfolk Island; on disturbed soil and probably overlooked. Also in India, Sri Lanka, Nepal, SE Asia, Indonesia, New Caledonia, China and Japan.

Qld: Coominglah Forest, near Monto, *I.G.Stone 21090 p.p., 21123* (MEL); Bunyip Street, Burleigh Heads, *K.Cafarella (I.G.Stone 21728)* (MEL).

Fissidens beckettii is probably close to *F. bifrons*, but it differs in having larger laminal cells and perichaetial leaves with a limbidium on all laminae. It could be mistaken for *F. curvatus* var. *curvatus*, but the latter has smaller laminal cells, and the vegetative leaves have their vaginant laminae joining near the margin.

Fissidens bifrons Schimp. ex Müll.Hal., *Bot. Zeitung (Berlin)* 17: 198 (1859)

T: Gronekloof, Cape of Good Hope, South Africa, *Breutel*; iso: BM.

Fissidens bryoidioides Broth., *Proc. Linn. Soc. New South Wales* 41: 576 (1916). T: Penshurst, N.S.W., *W.Forsyth 676*; holo: H-BR; iso: MEL, NSW.

[*Fissidens splachnifolius auct. non* Hornsch.: D.G.Catcheside, *Mosses of South Australia* 76 (1980)]

Illustration: D.G.Catcheside, *loc. cit.* fig. 16, as *F. splachnifolius*.

Dioicous. Plants small, yellow-green; sterile shoots 2–10 mm tall, often growing from the base of a female plant. Leaves distant, 6–15-jugate, cultriform, 0.2–0.5 mm long, 0.1–0.2 mm wide; apex sharply recurved. Costa strong, bent abruptly at the terminus of vaginant laminae, subpercurrent to barely excurrent. Vaginant laminae 70–90% of the leaf length, open, elimbate except on large leaves; dorsal lamina elimbate, failing above the base to short-decurrent. Margin entire to serrulate. Laminal cells small, irregularly quadrate to polygonal, c. 8–10 µm wide; ±rectangular and up to c. 20 µm long at the base of vaginant laminae. Fertile plants 2–5 mm long; leaves cultriform or straight, to c. 1 mm long and 0.25–0.30 mm wide; perichaetial leaves to 1.5 mm long; costa percurrent to excurrent. Limbidium of vaginant laminae broad below, narrowed above, often just extending onto the apical lamina.

Setae terminal, flexuose, 7–15 mm long. Capsule thecae curved, asymmetrical, c. 0.6 mm long; operculum conical, 0.30–0.35 mm long. Spores 12–17 µm diam.

Occurs in southern W.A., south-eastern S.A., eastern N.S.W., southern Vic. and on the west coast of Tas.; terrestrial and often growing in weedy places. Also in South Africa.

W.A.: Hovea Falls, Forrest Natl Park, *I.G.Stone 6202B* (MEL). S.A.: Bellevue Heights, near Adelaide, *D.G.Catcheside 75.78* (AD). N.S.W.: Penshurst, *W.Forsyth 679* (NSW). Vic.: Tallarook, *I.G.Stone 9318* (MEL). Tas.: W coast, road to Arthur Ck, *I.G.Stone 25275* (MEL).

Fissidens bifrons varies greatly in size depending on habitat. It often has delicate, flagelliferous innovations, consisting of alternating sequences of minute and very distantly set and larger cultriform leaves, arising from within the terminal perigonia, perichaetia or leaf axils.

Magill (1981) regarded *F. bifrons* as a synonym of *F. pygmaeus* Hornsch., but the latter has non-arcuate, ±symmetrical capsules, short setae (c. 3–5 mm long), larger spores and small vegetative leaves bordered on the vaginant laminae.

Fissidens curvatus Hornsch., *Linnaea* 15: 148 (1848)

T: Cape of Good Hope, South Africa, 24 Oct. 1827, *Ecklon*; holo: H-BR; iso: MEL.

Two varieties occur in Australia.

[The authors intended to create a third variety in their *Flora of Australia* treatment, *F. curvatus* var. *aristatus*, based on *F. aristatus* Broth. (see below) — Ed.]

Limbidium complete or almost complete on all laminae ..... var. **curvatus**
Limbidium vestigial or absent on dorsal and apical laminae ..... var. **inclinabilis**

Fissidens curvatus Hornsch. var. **curvatus**

Fissidens pungens Müll.Hal. & Hampe, *Linnaea* 26: 502 (1855). T: Barossa Ranges, S.A., *F.Mueller 3*; syn: BM; isosyn: MEL; Planty Creek [Plenty River], Vic., *F.Mueller 8*; syn: MEL, *fide* R.A.Pursell, *Mem. New York Bot. Gard.* 69: 62, 63 (1994).

Fissidens wildii Broth., *Öfvers. Förh. Finska Vetensk.-Soc.* 33: 94 (1891). T: Pimpana, Qld, Aug. 1887, *C.Wild 2*; holo: H-BR; iso: MEL, NSW.

Fissidens strictulus Müll.Hal., *Nuov. Giorn. Bot. Ital.*, n. ser., 5: 159 (1898). T: Mt Tui-Kio-San, western Schen-si, China, Sept. 1896, *J.P.Giraldi*; iso: FI *n.v.*

Fissidens liliputanobryoides Müll.Hal., *Gen. Musc. Fr.* 56 (1900), *nom. nud.*

Fissidens incurvobryoides Müll.Hal., *Gen. Musc. Fr.* 59 (1901), *nom. inval.* T: *n.v.*

Fissidens bartramiocarpus Müll.Hal., *Proc. Linn. Soc. New South Wales*, Suppl. 27: 22 (1902), *nom. nud.*

Fissidens sordidevirens Broth., *Proc. Linn. Soc. New South Wales* 41: 579 (1916). T: Cambewarra, N.S.W., *W.Forsyth 1140*; holo: H-BR; iso: MEL, NSW.

Fissidens warningensis Broth. ex Burges, *Proc. Linn. Soc. New South Wales* 57: 240 (1932), *nom. nud.* Based on: Mt Warning, N.S.W., *W.Forsyth 682* (NSW 214584).

Fissidens homomallulus Müll.Hal. ex Dixon, *Notes Roy. Bot. Gard. Edinburgh* 20: 94 (1948). T: Lilyvale, N.S.W., Sept. 1891, *T.Whitelegge*; holo: BM; iso: NSW.

Illustrations: G.O.K.Sainsbury, *Bull. Roy. Soc. New Zealand* 5: 46, pl. 6, fig. 3 (1955), as *F. pungens*; G.A.M.Scott & I.G.Stone, *Mosses Southern Australia* 85, pl. 7; 87, pl. 8; 89, pl. 9 (1976), as *F. pungens*; D.G.Catcheside, *Mosses of South Australia* 71, fig. 11 (1980), as *F. pungens*; Z.Iwatsuki & T.Suzuki, *J. Hattori Bot. Lab.* 48: 181, fig. 5 (1980), as *F. strictulus*; H.Streimann, *Mosses of Norfolk Island* 78, fig. 33 (2002), as *F. curvatus*; J.Beever, B.Malcolm & N.Malcolm, *The Moss Genus* Fissidens *in New Zealand[:] an illustrated key* 24 (2002); D.Meagher & B.Fuhrer, *A Field Guide to the Mosses and Allied Plants of Southern Australia* 39 (2003), as *F. curvatus*.

Polyoicous. Plants small, 2–5 mm tall, usually dimorphic. Sterile stems with leaves 8–12-jugate, ±uniform; hyaline axillary nodules weak. Leaves oblong-lanceolate or linear-lanceolate, 0.75–1.50 mm long, 0.15–0.30 mm wide; limbidium strong, 2–4-stratose, usually confluent with the excurrent costa; apex acute, acuminate. Vaginant laminae 50–75% of the leaf length, closed. Dorsal lamina tapered to the base; margin entire; laminal cells pellucid, firm- or thin-walled, ±hexagonal, 8–16 µm long, longer below. Male plants gemmiform, rhizautoicous or axillary at the base, occasionally separate.

Fertile stems short or long; leaves 2–10-jugate; perichaetial leaves with vaginant laminae ±open. Calyptra 0.40–0.55 mm long. Setae to 5 mm long. Capsules ovate, asymmetrical, inclined, to c. 1 mm long, rarely subsymmetrical and erect; operculum conical-rostrate, 0.40–0.55 mm long. Spores 9–15 µm diam. x =13, *fide* H.P.Ramsay, *Taxon* 16: 552–561 (1967), as *F. pungens*.

Widespread in all States and Territories; on soil and rock. Also in southern U.S.A., Mexico, South America, Europe, South Africa, India, China, Japan, New Caledonia, New Zealand, the Auckland Islands, Campbell Island and Norfolk Island.

W.A.: Cape D'Entrecasteau, *D.G.Catcheside 74.172* (AD, PERTH). N.T.: Daly R., 13 Aug. 1952, *V.Pederson* (MEL). S.A.: Mount Crawford Forest, *D.G.Catcheside 78.238* (AD). Qld: Chiminya Ck area, Lamington Natl Park, *D.G.Catcheside 65.48* (AD); Lake Eacham Natl Park, *I.G.Stone 25529A, 25551* (MEL); Wallaman Falls, *I.G.Stone 14655* (MEL). N.S.W.: Parsley Bay, Sydney, *I.G.Stone 21711* (MEL). A.C.T.: below Fishermans Gap, Tidbinbilla Valley, *D.G.Catcheside 65.48* (AD). Vic.: Kallista, *I.G.Stone 499* (MEL). Tas.: Marakoopa Cave area, *I.G.Stone 25201* (MEL).

A very variable moss in the dimensions of plants and the width of leaves. Typical *F. curvatus* is usually dimorphic, the sterile stems having smaller, more numerous, ±uniform leaves, the fertile one shorter with terminal subperichaetial and perichaetial leaves much larger than the lower, ±uniform leaves. The synonyms cited above are mostly longer plants than the typical form, usually fertile, and they do not always exhibit dimorphism. The holotype and isotype of *F. sordidevirens* is a mixture of *F. leptocladus* and *F. curvatus*. The *F. strictulus* expression is characterised by its erect, ovate, ±symmetrical capsules and rhizautoicous inflorescence. It commonly occurs in eastern Qld on soil banks in rainforest.

The limbidium can be absent from some leaf apices and, particularly in barren plants, it can be very imperfect.

Fissidens curvatus Hornsch. var. **inclinabilis** (Müll.Hal. ex Dixon) J.E.Beever, *Bryologist* 98: 315 (1995)

Fissidens inclinabilis Müll.Hal. ex Dixon, *Bull. New Zealand Inst.* 3(3): 100 (1923); *F. pungens* Müll.Hal. & Hampe var. *inclinabilis* (Müll.Hal. ex Dixon) Sainsb., *Rev. Bryol. Lichénol.* 21: 214 (1952). T: Christchurch, New Zealand, 1892, *Beckett*; holo: CHR-Beckett.

Fissidens semilimbatus Müll.Hal. & Hampe, *Linnaea* 26: 501 (1865). T: Yarra R., *F.Mueller*; holo: BM; iso: MEL.

Illustrations: J.Beever, B.Malcolm & N.Malcolm, *The Moss Genus* Fissidens *in New Zealand[:] an illustrated key* 26 (2002).

Rhizautoicous. Sterile shoots to 8 mm tall. Leaves lax, 12–15-jugate, largest in mid-stem, linear-lanceolate, 0.5–1.0 mm long, 0.15–0.20 mm wide; apex acute. Costa strong, subpercurrent to percurrent. Vaginant laminae c. three-quarters of the leaf length, c. half open; limbidium below 4–5-seriate; cells of outer row rectangular, broader and shorter; dorsal lamina broad above, narrowed below, ceasing above the base to slightly decurrent; limbidium absent or vestigial. Laminal cells thin-walled, ±quadrate to hexagonal, c. 6–12 × 6–10 µm; rectangular basally in vaginant laminae, 12–25 × 8–10 µm.

Fertile plants with leaves 4–8-jugate, lanceolate; perichaetial leaves to 1.4 mm long and 0.3 mm wide; limbidium intermittent; costa short-excurrent; vaginant laminae broad, open; limbidium conspicuous; dorsal lamina failing just above the leaf base, with a vestigial limbidium. Setae 2–5 mm long. Capsules oblong asymmetrical, ±horizontal; theca c. 0.6 mm long and 0.4 mm wide; operculum conical; rostrum erect, c. 0.5 mm long. Spores 15.0–17.5 µm diam.

Occurs in W.A., A.C.T., Vic. and Tas; also in New Zealand.

W.A.: Pemberton, *I.G.Stone 23598* (MEL). A.C.T.: Gibraltar Creek valley, 27 km SW of Canberra, 30 July 1977, *H.Streimann s.n.* (BM). Vic.: Latrobe R., *F.Mueller 56* (MEL); Brisbane Ra., *D.H.Ashton & I.G.Stone 699* (MEL). Tas.: Bates Ck, Woodbridge, 9 Nov. 1889, *W.A.Weymouth* (HO).

Small sterile plants having a vestigial or obsolete limbidium can be difficult to distinguish from *F. taylorii*. On the other hand, fertile plants are readily recognisable by the intermittent limbidium on dorsal laminae and the asymmetrical capsules.

Note: The authors intended to create a new variety, *F. curvatus* var. *aristatus* (basionym: *F. aristatus* Broth.), in their *Flora of Australia* treatment.

Fissidens aristatus Broth., *Proc. Linn. Soc. New South Wales* 41: 578 (1916)

T: Mossmans Bay, Falls, N.S.W., on damp soil, *W.W.Watts 4585*; syn: H-BR; isosyn: MEL, NSW; Brunswick River, N.S.W., on mud covered log by creek, *W.W.Watts 5238*; syn: H-BR; isosyn: NSW; Neutral Bay, near Sydney, N.S.W., damp waterway, *W.W.Watts 8080*; syn: H-BR; isosyn: NSW; Upper Terrace, The Eyrie, Manly, N.S.W., damp places in gutter, *W.W.Watts 6790*; syn: H-BR; isosyn: NSW.

Autoicous. Plants green, 5–10 mm tall, with terminal and lateral innovations that can be sterile, fertile or male. Axillary nodules small. Leaves lanceolate to oblong-lanceolate, 0.50–2.0 mm long, 0.25–0.50 mm wide; limbidium complete and confluent with the costa at the apex, 2–5-seriate, 1–3-stratose; apex acute or broadly acute, cuspidate. Costa excurrent in a sharp cusp. Vaginant laminae 50–67% of the leaf length, closed, often invaginated near the junction. Dorsal lamina usually ending at the insertion, occasionally slightly decurrent.

Laminal cells irregularly hexagonal, 10–20 × 8–10 µm, in vaginant laminae 10–20 × c. 10 µm.

Male inflorescences numerous, variously borne. Perichaetia terminal or terminating a lateral innovation; perichaetial leaves 2.0–2.5 mm long; vaginant laminae open. Setae 7–10 mm long. Calyptra conical, slightly split at the base, to 0.7 mm long. Capsules asymmetrical, curved; theca 0.5–0.8 mm long, 0.4–0.5 mm wide; exothecial cells oblong, weakly collenchymatous. Spores 12.5–16.0 µm diam.

Apparently endemic to eastern N.S.W., near the Qld border and in Sydney; grows in very wet, muddy conditions.

N.S.W.: Newrybar, Richmond R., *W.W.Watts 2966* (NSW).

Fissidens aristatus was incorrectly reduced to synonymy in *F. pungens* (Stone, 1990a), but later reinstated (Stone, 1994a). Pursell *et al.* (1992) regarded it as a synonym, but it seems preferable to treat it as a variety of *F. curvatus*. It is usually a larger plant, often branching, and the perigonia differ in their position from those of the type variety.

Stems and leafs are similar to but larger than those of *F. curvatus*, and the cells of the vaginant laminae are not as conspicuously enlarged. The dimorphic habit is absent, and plants are larger with lateral branches and sporophytes. Moreover, male inflorescences are numerous, either sessile or on axillary rhizoids, frequently subtending a fertile innovation, sometimes terminating a lateral innovation, occasionally terminal on a separate 4–8-jugate plant.

Fissidens dietrichiae Müll.Hal., *Linnaea* 37: 146 (1872)

T: Brisbane R., Qld, 1884, *A.Dietrich 444*; holo: S *n.v.*; iso: BM, MEL, NY.

Fissidens undatodecurrens Müll.Hal., *Enum. Bryin. Exot.* 90: (1889). T: Ashgrove, near Brisbane, Qld, May 1885, *H.Tryon*; iso: MEL.

Fissidens praemollis Broth., *Proc. Linn. Soc. New South Wales* 41: 578 (1916). T: Skinners Head, Richmond R., N.S.W., 1901, *W.W.Watts 5371*; holo: H-BR; iso: MEL, NSW.

Fissidens densifolius Broth., *Queensland Bot. Bull.* 4: 21 (1891), *nom. nud.* T: Mt Perry, Qld, *J.Keys*(?); iso: MEL.

Fissidens sydneyensis Geh., *Proc. Linn. Soc. New South Wales*, Suppl. 27: 29 (1902), *nom. nud*. Based on: Minto, near Sydney, N.S.W., *T.Whitelegge* 263; iso: MEL.

[*Fissidens crassipes auct. non* Wilson ex Bruch & Schimp.: G.A.M.Scott & I.G.Stone, *Mosses Southern Australia* 96 (1976)]

Illustrations: M.A.Bruggemann-Nannenga, *Proc. Kon. Ned. Akad. Wetensch*., ser. C, 82: 23, fig. 5 (1979); D.G.Catcheside, *Mosses of South Australia* 73, fig. 13 (1980), as *F. crassipes*; H.Streimann, *Mosses of Norfolk Island* 80, fig. 34 (2002).

Dioicous or synoicous. Stems simple or branched, robust, 5–40 mm long, with minute axillary nodules. Leaves ±distant, multijugate, homomallous, curled when dry, elliptical to obovate, 1.1–2.0 mm long, 0.3–0.7 mm wide; limbidium mostly unistratose, biseriate, to 5 rows in vaginant laminae, the outer rectangular to quadrate proximally; apex obtuse, apiculate. Costa usually subpercurrent. Vaginant laminae exceeding half the leaf length, ±closed; dorsal lamina usually slightly decurrent. Lamina cells hexagonal, firm-walled, 11–15 µm diam., 20–25 × 10–12 µm juxtacostally at the base of the vaginant lamina.

Perichaetial leaves more acuminate than vegetative leaves. Setae 4–10 mm long. Capsules suberect, subsymmetrical; theca oblong, c. 0.8 mm long and 0.65 mm wide; operculum 0.3–0.7 mm long, conical-acute. Spores 17–26 µm diam.

Occurs in N.T., S.A., Qld, N.S.W., A.C.T., Vic., as well as Lord Howe Island and Norfolk Island; semiaquatic on rocks or terrestrial in damp places. Also in New Caledonia and the Kermadec Islands.

N.T.: Reedy Rock Hole, George Gill Ra., *A.C.Beauglehole 20937* (MEL). S.A.: Clarendon, *J.O.Tepper 587* (NY). Qld: Cania Gorge Natl Park, *I.G.Stone 20941A* (MEL). N.S.W.: Hickeys Falls, S of Coonabarabran, *I.G.Stone 8408B* (MEL); Hanging Rock Ck, Barkers Vale, *H.Streimann 6141* (CANB).

A.C.T.: Uriarra Crossing, Murrumbidgee R., *D.G.Catcheside 64.82* (AD). Vic.: Yarra R. at Heyington Railway Stn, *J.H.Willis 154* (BM, MEL).

Fissidens diversifolius Mitt., *J. Linn. Soc., Bot.* (Suppl.) 1: 140 (1859)

T: North Bihar, India, *J.D.Hooker 633*; lecto: NY.

Illustrations: H.C.Gangulee, *Mosses of Eastern India* 2: 492, fig. 228 (1971); Z.Iwatsuki & T. Suzuki, *J. Hattori Bot. Lab.* 51: pl. 17 (1982)

Autoicous or dioicous. Plants pale green. Leaves 5–15-jugate, imbricate above, ovate to oblong-lanceolate 1.2–1.5 mm long, 0.5–0.6 mm wide; apex ±acute; costa ending below the apex. Vaginant laminae two-thirds to three-quarters of the leaf length, c. half open; limbidium generally distinct, 2–4 cells wide, unistratose to bistratose, rarely extending to the apical lamina. Dorsal lamina narrowed to the base. Margin ±entire. Laminal cells irregularly hexagonal, firm-walled, 7–10 µm wide, larger proximally in vaginant laminae.

Fertile stems 3–6 mm long. Setae 2–3 mm long. Capsules not seen.

Apparently very rare in N.S.W.; collected from damp soil near a stream. Also in India, Burma, China and Japan.

N.S.W.: Hickeys Falls, 38 km S of Coonabarabran, *I.G.Stone 8408* (MEL).

Fissidens leptocladus Müll.Hal. ex Rodway, *Pap. & Proc. Roy. Soc. Tasmania* 1912: 136 (1913)

Fissidens leptocladus Müll.Hal., *Gen. Musc. Fr.* 59 (1901); *F. rigidiusculus* Broth. var. *leptocladus* (Müll.Hal. ex Rodway) Broth., *Proc. Linn. Soc. New South Wales* 41: 578 (1916). T: Guy Fawkes Rivulet, base of M. Wellington, Tas., 6 Sept. 1890, *W.A.Weymouth 385*; lecto: HO, *fide* I.G.Stone, *J. Bryol.* 16: 262 (1990); isolecto: CANB, L, NY; on face of rock on bank of Guy Fawkes Rivulet, Tas., 1 Jan. 1897, W.*A.Weymouth 2157*; para: HO, on damp bank, 3 Sept. 1906, *W.A.Weymouth 2281*; para: HO.

Fissidens amblyothallioides Broth. & Watts, *Proc. Linn. Soc. New South Wales* 40: 366 (1915). T: gully, south of King's [property], Lord Howe Is., *W.W.Watts 153*; syn: H-BR; *loc. id., W.W.Watts 145, 157, 163, 178*; syn: H-BR, NSW.

Fissidens microblastus Broth., *Proc. Linn. Soc. New South Wales* 24: 632 (1900), *nom. nud.*; *F. montecolli* Watts ex W.W.Watts & T.Whitelegge, *Proc. Linn. Soc. New South Wales*, Suppl. 26 (1902), *nom. nud.* Based on: Montecollum, Brunswick R., N.S.W., 17 Sept. 1897, *W.W.Watts 1489*; BM, H-BR, NSW.

Fissidens rigidiusculus Broth., *Proc. Linn. Soc. New South Wales* 41: 577 (1916), *nom. illeg.* T: Fitzroy Falls, Moss Vale, N.S.W., *W.Forsyth 669*; iso: NSW(?) *n.v.*

Fissidens pachyneuron Dixon, *Notes Roy. Bot. Gard. Edinburgh* 20: 93 (1950). T: Richmond R., N.S.W., *W.W.Watts 2949*; holo: BM, iso: NSW.

Fissidens leptocladus var. *cheesemanii* Dixon, *Bull. New Zealand Inst.* 3: 101 (1923). T: locality unknown, New Zealand, 1882, *Cheeseman*; *n.v.*

Illustrations: G.A.M.Scott & I.G.Stone, *Mosses of Southern Australia* 85, pl. 7; 87, pl. 8; 89, pl. 9 (1976); D.G.Catcheside, *Mosses of South Australia* 71, fig. 12 (1980); J.Beever, B.Malcolm & N.Malcolm, *The Moss Genus* Fissidens *in New Zealand[:] an illustrated key* 38 (2002); H.Streimann, *Mosses of Norfolk Island* 81, fig. 35 (2002).

Dioicous. Plants 5–20 mm tall; axillary nodules small. Leaves usually distant, occasionally imbricate, linear-lanceolate, lanceolate or oblong-ovate, 1.00–1.75 mm long, 0.25–0.45 mm wide, 2–7 times longer than wide; when dry strongly falcate-decurved or secund, often crisped. Limbidium throughout except at apex, rarely confluent with the costa, cartilaginous, unistratose, narrow, usually widening in vaginant laminae; apex acute to narrowly acuminate or broadly obtuse-apiculate; dorsal lamina usually reaching the leaf insertion or short-decurrent, occasionally bistratose at the base. Costa subpercurrent, rarely percurrent, occasionally with a few laminal cells encroaching over the adaxial surface. Vaginant laminae more than half the leaf length, closed. Laminal cells small, firm-walled, convex, dark, quadrate to hexagonal, 5–9 µm wide, juxtacostally hyaline at the leaf base, thick-walled, to 20 µm or more long, c.10 µm wide.

Gametoecia terminal. Perichaetial leaves to 2 mm long; limbidium proximally on vaginant laminae sometimes with an outer row of ±quadrate cells. Setae to 6 mm long. Capsules

±symmetrical, oblong-ovate, c. 0.5 mm long; apophysis swollen. Operculum c. 0.5 mm long; beak erect or inclined. Spores 10–14 µm diam.

Widespread in all States and Territories; grows on damp soil or rock in shaded places, occasionally in basalt or limestone caves. Also in southern South America, Norfolk Island, New Zealand, the Auckland Islands and Campbell Island.

W.A.: Nancys Peak, Porongorup Ra., *D.G.Catcheside 74.266* (AD, PERTH). N.T.: Mt Riddock, Harts Ra., *J.H.Willis* (MEL 1024239). S.A.: Hindmarsh Valley Falls, *D.G.Catcheside 54.327* (AD). Qld: Dalrymple Gap, Cardwell, *I.G.Stone 19127A* (MEL); Lake Eacham Natl Park, *I.G.Stone 25517* (MEL); Hippy Tower, Chillagoe, *M.Godwin C2487* (AD). N.S.W.: Emigrant Ck., *W.W.Watts 3612* (NSW); Warrumbungle Mtns, *I.G.Stone 4135 p.p.* (MEL). Vic.: Byaduk Caves, *D.G.Catcheside 77.180* (AD). Tas.: Truganini Track, near Hobart, *I.G.Stone 25325* (MEL); Julius River Reserve, S of Smithton, *I.G.Stone 25286*, *25287*, *25288* (MEL).

This taxon is extremely variable in size and leaf shape which, even on the same plant, can range from narrowly lanceolate to comparatively broad when approaching var. *patulifolius*. Similar to *F. dietrichiae*, but laminal cells of the latter are larger, and the limbidium is stronger. There are also similarities to the type of *F. schmidii* Müll.Hal., but in that species the limbidium is predominantly bistratose.

[The authors intended to make the new combination *F. leptocladus* var. *patulifolius* (based on *F. patulifolius* Dixon) in their *Flora of Australia* treatment, due to its comparatively broad leaves and obtuse-apiculate leaf apices — Ed.]

Fissidens patulifolius Dixon, *Proc. Roy. Soc. Queensland* 53: 23 (1941)

T: Tully R., above Tully Falls, Qld, *H.Flecker 6302*; holo: BM; iso: CANB.

Dioicous. Plants 5–20 mm tall; axillary nodules small. Leaves broadly oblong-ovate, 1.0–1.3 mm long, 0.5–0.6 mm wide, 2–2.5 times longer than wide; apex obtuse, apiculate. Suture of vaginant laminae usually markedly truncate.

Perichaetial leaves with the limbidium scarcely widened proximally in vaginant laminae. Capsules oval, tapered to the neck, ±symmetrical, slightly inclined. Operculum conical; rostrum with a thick erect beak 0.3–0.4 mm long.

Endemic to north-eastern and central Qld; uncommon and usually growing close to streams.

Qld: Dalrymple Gap, Cardwell, *I.G.Stone 19127* (MEL); Moss Garden, Carnarvon Natl Park, *I.G.Stone 20347* (MEL); Lake Eacham Natl Park, *I.G.Stone 25517* (MEL).

Fissidens megalotis Schimp. ex Müll.Hal., *Bot. Zeitung (Berlin)* 16: 154 (1858)

T: Gronekloof, Cape of Good Hope, South Africa, *Breutel*; holo: BM.

Fissidens vittatus Hook.f. & Wilson, *Fl. Tasman.* 2: 167 (1859). T: Circular Head, Tas., *R.Gunn 1697*; holo: BM; iso: HO.

Fissidens forsythii Broth., *Proc. Linn. Soc. New South Wales* 41: 576 (1916). T: near Barbers Creek, N.S.W., Sept. 1899, *W.Forsyth 566*; holo: H-BR; iso: MEL, NSW.

Illustrations: G.A.M.Scott & I.G.Stone, *op. cit.* 85, pl. 7; 87, pl. 8; 89, pl. 9 (1976); D.G.Catcheside, *op. cit.* 77, fig. 17 (1980), all as *F. vittatus*; J.Beever, B.Malcolm & N.Malcolm, *The Moss Genus* Fissidens *in New Zealand[:] an illustrated key* 44 (2002); D.Meagher & B.Fuhrer, *A Field Guide to the Mosses and Allied Plants of Southern Australia* 43 (2003).

Dioicous. Plants dark green, to 8 mm tall, curled downwards when dry. Leaves circinate when dry, often somewhat recurved when moist, broadly oblong-lanceolate, 1.0–1.5 mm long, 0.35–0.50 mm wide; limbidium narrow, uniseriate to biseriate, unistratose to bistratose, often failing near the apex, broader in vaginant laminae and proximally intramarginal with a broad vitta of laminal cells; apex acute, somewhat retrorse. Costa strong, short-excurrent. Vaginant laminae very broad, inflated, more than half the leaf length, open. Dorsal lamina tapered to the base, not decurrent. Margin entire to serrulate, except often coarsely crenate-dentate on vaginant laminae outside the vitta. Laminal cells firm-walled, rounded c. 6 µm diam., convex, obscurely bipapillose, basally larger and clearer.

Setae c. 5 mm long. Capsules short-oblong, horizontal, asymmetrical, c. 1 mm long; operculum rostrate, c. 0.5 mm long. Spores green, 20–22 µm diam.

Widespread in southern Australia (W.A., S.A., N.S.W., A.C.T, Vic. and Tas.); grows on soil, often in low rainfall areas. Also in southern Africa and New Zealand.

W.A.: Cascades, near Pemberton, *D.G.Catcheside 74.175* (AD). S.A.: Eyre Penin., 5 miles [c. 8 km] S of L. Gairdner, *D.E.A.Catcheside* (AD). N.S.W.: Inverell, *I.G.Stone 17785* (MEL). A.C.T.: Kambah, beside Murrumbidgee R., *D.G.Catcheside 64.74* (AD). Vic.: Licola, *I.G.Stone 24792A* (MEL). Tas.: Strickland, July 1912, *L.Rodway* (HO).

While this species can have slender, flagelliferous innovations with recurved leaves resembling those of *F. bifrons*, the coarsely crenate-dentate margins of the vaginant laminae are diagnostic.

Fissidens perangustus Broth., *Proc. Linn. Soc. New South Wales* 41: 577 (1916)

T: The Eyrie, Manly, Sydney, N.S.W., *W.W.Watts 6790A*; syn: H-BR, MEL, NSW; *loc. id.*, *W.W.Watts 6792*; syn: H-BR, NSW.

Illustrations: J.Beever, B.Malcolm & N.Malcolm, *The Moss Genus* Fissidens *in New Zealand[:] an illustrated key* 54 (2002).

Autoicous. Sterile plants occasionally forming dense procumbent mats, slender, often branched; female branches lateral, often subterminal and radiculose at the base; regrowth from older plants common. Stems 5–20 mm tall, with distinct axillary nodules. Leaves multijugate, uniform, distant, linear-lanceolate, 0.5–0.6 mm long, 0.10–0.15 mm wide; limbidium biseriate to triseriate, bistratose to tristratose, not reaching the apex, often adhering to the costa proximally on the dorsal lamina; apex bluntly acute; costa subpercurrent. Vaginant laminae exceeding half the leaf length, closed. Laminal cells ±hexagonal, 10–15 × 7–9 µm.

Perigonia usually gemmiform at the base of female branches, occasionally terminal on an axillary shoot. Female shoots 3–5-jugate; perichaetials to 1 mm long; vaginant laminae occasionally open. Calyptra c. 0.4 mm long, cucullate. Capsules subsymmetrical, ±erect, c. 0.5 mm long and wide; operculum conical-rostellate, c. 0.35 mm long. Spores c. 20–25 µm diam.

Occurs in eastern Qld and N.S.W.; also in northern New Zealand.

Qld: Yandina, *I.G.Stone 17329 p.p.* (MEL); Carnarvon Gorge Natl Park, *H.Streimann 52212* (CANB); Mickey Ck, Carnarvon Gorge Natl Park, *I.G.Stone 20333* (MEL).

Fissidens perangustus can be distinguished from *F. curvatus* by limbidium failing below the apex, a subpercurrent costa, lateral female branches and comparatively large spores.

Fissidens rigidulus Hook.f. & Wilson, *Fl. Nov.-Zel.* 2: 61 (1854) var. **rigidulus**

T: Wellington, New Zealand, 1850, *Lyall 95*; lecto: BM, *fide* M.A.Bruggeman-Nannenga, *Proc. Kon. Ned. Akad. Wetensch.*, ser. C, 82: 20 (1979).

Fissidens tortuosus Geh. & Hampe, *Rev. Bryol.* 8: 27 (1881). T: locality unknown, *O.Beccari 38*; *n.v.*, *fide* M.A.Bruggeman-Nannenga, *op. cit.* 16.

Illustrations: G.A.M.Scott & I.G.Stone, *Mosses of Southern Australia* 84–88, pl. 7–9 (1976); M.A.Bruggemann-Nannenga, *op. cit.* 17, fig. 4a–g; D.G.Catcheside, *Mosses of South Australia* 73, fig. 14 (1980); J.Beever, B.Malcolm & N.Malcolm, *The Moss Genus* Fissidens *in New Zealand[:] an illustrated key* 58 (2002).

Dioicous. Shoots robust, stiff, 2–6 cm tall, branched. Leaves rigid, ±secund when moist, individually curled and twisted when dry, oblong to lanceolate, 2.5–4.0 mm long, 0.6–0.7 mm wide; limbidium broad, cartilaginous, yellow, multistratose, complete except at the apex and base of dorsal laminae; apex acute to acuminate. Costa very strong, yellow or reddish, ±percurrent. Vaginant laminae closed, c. three-fifths of the leaf length; dorsal lamina tapered, short-decurrent. Laminal cells small, obscure, ±quadrate to hexagonal, 6–9 µm wide, usually pluristratose juxtacostally.

Setae 4–8 mm long. Capsule theca ±oblong, c. 1 mm long, erect or inclined, asymmetrical; operculum rostrate, the same length as the theca. Spores c. 20 µm diam.

Occurs in S.A. Qld, N.S.W., A.C.T., Vic. and Tas.; forming dense, dark green mats in aquatic or semi-aquatic habitats, on rocks or earth banks. Also in Central America, South America, the Falkland Islands, New Guinea, New Caledonia, New Zealand, the Auckland Islands, Campbell Island and Macquarie Island.

S.A.: Ewens Ponds, Port MacDonnell, *M.Forbes MUCV 2652* (MUCV). Qld: Bunya Mountains Natl Park, *I.G.Stone 13365B* (MEL). N.S.W.: Brown Mtn, near Nimmitabel, *D.G.Catcheside 54.88* (AD). A.C.T.: Cascades Trail, Tidbinbilla, *D.G.Catcheside 75.9* (AD). Vic.: Tarra Valley, *I.G.Stone 9980* (MEL). Tas.: Lenas Ck., Wardlaw Pass, near St. Marys, 1881, *W.A.Weymouth* (HO, MEL).

Fissidens rigidulus var. *pseudostrictus* J.E.Beever is endemic to the North Island, New Zealand (Beever *et al.*, 2002).

Fissidens taylorii Müll.Hal., *Syn. Musc. Frond.* 1: 65 (1848)

Fissidens pygmaeus Taylor, *London J. Bot.* 5: 66 (1846), *nom. illeg., non F. pygmaeus* Hornsch. (1841). T: Swan River, W.A., *J.Drummond*; holo: BM.

Autoicous. Plants minute, terrestrial; shoots dimorphic. Leaves 8–multijugate, erecto-patent, imbricate or distant, subequal, asymmetrical, oblong or linear to lanceolate, mostly c. 0.5 mm long; apex obtuse to acute, often apiculate. Costa subpercurrent to short-excurrent. Vaginant laminae usually 3/4 or more of the leaf length, half closed to almost closed, elimbate or limbate; apical lamina short, elimbate; dorsal lamina very narrowed to the base or failing above, elimbate; margin subentire. Laminal cells irregularly quadrate-hexagonal; longer in vaginant laminae and rhomboidal to rectangular.

Perigonia gemmiform, lateral or basal in leaf axils of sterile or female shoots, occasionally rhizautoicous or apparently independent. Female shoots 2–5-jugate, usually lateral or basal on sterile shoots; lower leaves bract-like; inner perichaetial leaves c. 1.0–1.5 mm long; apical and dorsal laminae narrow, elimbate, the dorsal usually short, occasionally almost obsolete; vaginant laminae inflated, usually limbate, occupying most of the leaf, ±open; margin entire to denticulate; costa subpercurrent to excurrent. Capsule thecae oval, erect or inclined, ±symmetrical, exceeding 40 cells around the circumference; operculum rostellate. Peristome either *bryoides*-type with spirally thickened forks and very hygroscopic, or modified with the teeth entire or rimose, not or weakly spirally thickened and only weakly hygroscopic.

Fissidens taylorii is characterised by the distinctly dimorphic sterile and fertile shoots. The latter, consisting of a few bract-like leaves subtending the perichaetials, are usually axillary, either basal or lateral, but never terminal on an otherwise vegetative leafy stem. The plants can occasionally be dioicous, as male, female and sterile shoots are often independent (although possibly derived by detachment from leaf axils of buried moribund plants).

Descriptions and illustrations are included in the comprehensive revision by Stone & Beever (1996).

Occurs in all Australian States and Territories, usually on compacted soil from semi-desert to more moist coastal areas but not in the wet-tropics. Also in North and South America and in New Zealand. All four varieties are known from Australia.

1 Leaves of sterile shoots broadest above mid-leaf, 2–2.5 times longer than wide; vaginant laminae c. 90% or more of the leaf length; limbidium generally absent; peristome teeth split, with 2 spirally thickened arms..... var. **gillianus**

1: Leaves of sterile shoots usually broadest at or below mid-leaf, 3–4.5 times longer than wide; vaginant laminae c. 75% of the leaf length; limbidium present or absent; peristome teeth entire or split.....2

2 Peristome teeth entire, rimose or occasionally weakly split, papillose, ±erect whether dry or moist; leaves of sterile shoots subobtuse-apiculate to acute; costa usually percurrent .....var. **sainsburianus**

2: Peristome teeth forked, the arms spirally ornamented, recurved when dry, strongly incurved when moist; leaves of sterile shoots obtuse, subobtuse or acute; costa subpercurrent to short-excurrent.....3

3 Sterile shoots 2–4 mm tall; leaves 0.30–0.85 mm long; apex obtuse, subobtuse-apiculate to acute; perigonia occasionally separate, often single and axillary at the base of sterile or perichaetial shoots or numerous and axillary, the leaves then short, obtuse or obtuse-apiculate ..... var. **taylorii**

3: Sterile shoots 5–10 mm tall; leaves 0.5–1.0 mm long; apex acute; perigonia numerous in leaf axils; female shoots 1 or more, axillary near the base ..... var. **epiphytus**

Fissidens taylorii Müll.Hal. var. **taylorii**

Fissidens basilaris Müll.Hal. & Hampe, *Linnaea* 26: 501 (1855). T: Barossa Range, S.A., *F.Mueller*; holo: BM; iso: MEL.

Fissidens sarcophyllus Burchard & Broth., *Pap. & Proc. Roy. Soc. Tasmania* 1895: 112 (1896), *nom. nud.*; *F. weymouthii* Paris, *Index Bryol.*, Suppl. 166 (1900), *nom. nud.* Based on: Mt Wellington, Tas., *W.A.Weymouth 772*; HO, *fide* I.G.Stone, *J. Bryol.* 16: 263 (1990).

Fissidens sullivanii Müll.Hal., *Gen. Musc. Fr.* 56 (1901), *nom. nud.* Based on: Mt Ararat, Vic., Oct. 1882, *D.Sullivan*; MEL 29185.

Fissidens nanopyxis Müll.Hal., *Gen. Musc. Fr.* 59 (1901), *nom. nud.* Based on: Port Phillip, Vic., *C.French 14*; MEL 29187.

Fissidens sublimbatus Broth., *Proc. Linn. Soc. New South Wales*, Suppl. 27: 28 (1902), *nom. nud.* Based on: Lochiel, Vic., on submerged decaying log, 29 July 1900, *F.M.Reader 140*; NSW. [Immature material, therefore the correct variety remains in doubt (Stone & Beever, 1996: 63).]

Illustrations: I.G.Stone & J.E.Beever, *J. Bryol.* 19: 52, fig. 1; 53, fig. 2a, c, f; 55, fig. 4 (1996); J.Beever, B.Malcolm & N.Malcolm, *The Moss Genus* Fissidens *in New Zealand[:] an illustrated key* 68 (2002).

Vegetative shoots 2–4 mm tall (or more by repeated innovations). Leaves often boat-shaped, 0.30–0.85 mm long, 0.15–0.19 mm wide, 3–4.5 times longer than wide; apex obtuse to acute, occasionally apiculate; costa subpercurrent to short-excurrent. Vaginant laminae elimbate or weakly limbate. Laminal cells thin- or firm-walled, mostly 8–20 × 8–12 µm. Gametoecia mostly axillary on vegetative stems, either basal or lateral, sometimes independent. Cells of vaginant laminae of perichaetial leaves to 30 µm long, those in the limbidium to 80 µm. Setae 2–6 mm long, erect or flexuose. Peristome teeth recurved when dry, strongly incurved when moist, divided to c. half-way, the arms spirally thickened. Spores 15–32 µm diam.

The most widespread and variable variety in Australia, extending from comparatively moist coastal regions into arid Central Australia (W.A., N.T., S.A., Qld, N.S.W., A.C.T., Vic. and Tas.). Also in North and South America and New Zealand.

W.A.: Murchison Gorge, *I.G.Stone 6176* (MEL). N.T.: Standley Chasm, *I.G.Stone 5173* (MEL). S.A.: Morialta Falls, *D.G.Catcheside 52.56* (AD). Qld: Carnarvon Gorge, *I.G.Stone 20240 p.p.* (MEL). N.S.W.: Green Gully, near Young, *W.W.Watts 7164* (NSW). Vic.: Moyston, *I.G.Stone 9375* (MEL). Tas.: Proctors Rd, Hobart, *W.A.Weymouth 2840* (HO).

Gametoecia frequently grow from old buried stems, often developing rhizoids at their bases and becoming independent plants. The *taylorii* 'expression', which is more common in arid regions, is not difficult to distinguish from the *basilaris* 'expression', its leaves geing shorter and broader, the apex is more obtuse, the costa is shorter, cells are slightly smaller and spores larger; however, intermediates do occur. The *basilaris* 'expression' does not occur in W.A.

Fissidens taylorii Müll.Hal. var. **gillianus** (Catches. & I.G.Stone) I.G.Stone & J.E.Beever, *J. Bryol.* 19: 51, 54 (1996)

Fissidens gillianus Catches. & I.G.Stone, *J. Adelaide Bot. Gard.* 1: 5 (1988). T: George Gill Range, N.T., *J.H.Willis*; holo: MEL 1022414.

Illustrations: D.G.Catcheside & I.G.Stone, *op. cit.* 6, fig. 3; 7, fig. 4, as *F. gillianus*; I.G.Stone & J.E.Beever, *op. cit.* 52, fig. 1; 54, fig. 3c; 56, fig. 5a–d; H.Streimann, *Mosses of Norfolk Island* 88, fig. 39 (2002).

Leaves to c. 0.5 mm long and 0.2 mm wide, 2–2.5 times longer than wide, often broadest above; apex obtuse, apiculate. Costa subpercurrent. Vaginant laminae c. 90% of the leaf length, almost closed, elimbate. Dorsal lamina bowed outwards above, tapering to 1 row of cells basally. Cells ±hexagonal, 10–15 × 8–10 µm. Rhizoidal gemmae 2–4-celled. Perigonia axillary or basal on female shoots which are usually lateral or basal on vegetative shoots.

Perichaetial leaves elimbidate, or the limbidium ill-defined. Setae 2.5–3.0 mm long, thick. Capsule thecae short, cylindrical, c. 0.6 mm long and 0.35 mm wide. Peristome with inner trabeculae deeper than in var. *taylorii*. Spores 18–20 µm diam.

Occurs in W.A., N.T. and N.S.W.; also on Phillip Island in the Norfolk Island group. Usually on comparatively moist red soil in arid regions.

W.A.: Three Mile Rocks, 37 km NNE of Bullfinch, *R.Wyatt & A.Stoneburner 4199* (PERTH). N.T.: Carmichael Crag, George Gill Ra., *A.C.Beauglehole 26400A* (MEL). N.S.W.: Caloola Ck, 62 km NNE of Broken Hill, *H.Streimann 6334* (CANB).

Distinguished from var. *taylorii* by the shorter and broader leaves with longer vaginant laminae. However, some specimens can be difficult to separate unless peristomes are present.

Fissidens taylorii Müll.Hal. var. **epiphytus** (Allison) I.G.Stone & J.E.Beever, *J. Bryol.* 19: 57 (1996)

Fissidens epiphytus Allison, *Trans. Roy. Soc. New Zealand* 88: 10 (1960). T: near Roxburgh, Otago, New Zealand, *K.W.Allison 5860*; holo: CHR; iso: MEL

Illustrations: I.G.Stone & J.E.Beever, *op. cit.* 56, fig. 5j–m; 58, fig. 6; J.Beever, B.Malcolm & N.Malcolm, *The Moss Genus* Fissidens *in New Zealand[:] an illustrated key* 64 (2002).

Sterile shoots to 10 mm tall. Leaves 15–25-jugate, patent, oblong-lanceolate, 0.5–1.0 mm long; apex acute; vaginant laminae usually limbate. Gametoecia axillary on barren stems, the male numerous, 0.2–0.3 mm tall, the female sparse, usually in lower leaf axils, 0.5–1.5 mm tall. Peristome as in var. *taylorii*. Spores c. 36 µm diam.

Rare in Vic. and Tas.; also in south-eastern New Zealand.

Vic.: Mt Eccles, *A.C.Beauglehole 3060* (MEL). Tas.: Pittwater Bluff, *A.Moscal 12990* (HO).

This variety is characterised by having much larger plants, with longer leaves and more numerous axillary perigonia.

Note: *Fissidens taylorii* Müll.Hal. var. *floribundus* (Wilson) Wijk & Margad., *Taxon* 8: 106 (1959); *F. brevifolius* Hook.f. & Wilson var. *floribundus* Wilson, *in* J.D.Hooker, *Fl. Tasman.* 2: 167 (1859). T: New Norfolk, Derwent, Tas., *Oldfield 218*; holo: BM (not located).

It is likely that the type of *F. brevifolius* var. *floribundus* is synonymous with *F. taylorii* var. *epiphytus*; it was collected from a locality not far from that of the Moscal specimen. If these prove to represent the same taxon, their correct name would be *F. taylorii* var. *floribundus*.

Fissidens taylorii Müll.Hal. var. **sainsburianus** Allison, *Trans. Roy. Soc. New Zealand* 88: 9 (1960)

Fissidens brevifolius Hook.f. & Wilson, *Fl. Nov.-Zel.* 2: 61 (1854). T: North Island, New Zealand, 1850, *W.Colenso*; holo: BM.

Fissidens elamellosus Müll.Hal. & Hampe., *Linnaea* 28: 214 (1856). T: by Yarra River, Vic., *F.Mueller*; holo: BM; iso: MEL.

Fissidens macrodus Hampe, *Linnaea* 30: 645 (1858). T: by Yarra River, Vic., *F.Mueller*; holo: BM; iso: MEL.

Sainsburia novaezelandiae Dixon, *Bryologist* 44: 40 (1941). T: Whakaki Lagoon, near Wairoa, Hawkes Bay, New Zealand, *G.O.K.Sainsbury 960*; holo: BM *n.v.*; iso: WELT *n.v.*

Illustrations: D.G.Catcheside, *Mosses of South Australia* 74, fig. 15d–f (1980), as *F. taylorii*; I.G.Stone & J.E.Beever, *op. cit.* 53, fig. 2b, d, e, g; 54, fig. 3b, d, f; 60, fig. 7; 61, fig. 8; 62, fig. 9; J.Beever, B.Malcolm & N.Malcolm, *The Moss Genus* Fissidens *in New Zealand[:] an illustrated key* 66 (2002).

This variety resembles var. *taylorii*, but the apical and dorsal laminae of vegetative leaves are often more reduced, and the laminal cells are slightly smaller. Vaginant laminae of perichaetial leaves entire or dentate, often elimbate in the upper part, widely bordered and entire below; distal lamina narrowly subulate; costa strong, often excurrent in a cusp. Peristome inserted well below the rim; exostome teeth ±erect, perforated, entire or weakly forked at the apex; lamellae finely papillose abaxially at the base, larger above the papillae,

often in vertical or oblique rows, adaxially above with longitudinal ridges; tips occasionally faintly spirally thickened. Spores 12–25 µm diam.

Occurs in S.A., N.S.W., Vic. and Tas. Also in New Zealand.

S.A.: Mount Crawford, *D.G.Catcheside 77.270* (AD). N.S.W.: off Tubbal Rd, 13 miles [20.8 km] from Young, *W.W.Watts 7188* (NSW). Vic.: Yarra, 1854, *F.Mueller 100* (MEL); McKillops Bridge, Snowy R., East Gippsland, *I.G.Stone 14200* (MEL). Tas.: Western Junction, Perth road, 6 Sept. 1888, *W.A.Weymouth* (HO).