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

Type: "an einer Mauer in Mr. Auret's Garten unter dem Löwenrücken", Cape Prov., South Africa, 24 Oct. 1827, *Ecklon s.n.*; lecto: H-BR, *fide* Magill (1981), *fide* Pursell, *Bryologist* 97: 256 (1994); isolecto: BM, S.

Plants small, scattered, yellow-green, glossy, dimorphic, growing on soil. **Stems** 1–5 (–8) mm long, simple; in section with a central strand. **Leaves** larger above, slightly contorted when dry, erect-spreading when moist, linear-lanceolate, 0.5–2.0 mm long, 0.15–0.50 mm wide; **margins** entire, **limbate** throughout (except var. *inclinabilis*); **limbidium** strong, 2–5 cells wide, 1 or 2 cells thick; **vaginant laminae** reaching 1/2–2/3 (–3/4) leaf length; apex half open to closed; **dorsal lamina** tapered to the base, mostly ending above the insertion. **Laminal cells** variable in shape, rounded, angular, ±hexagonal to rhomboid or rectangular, 8–15 µm long, smooth, flat, becoming rectangular towards the insertion. **Costa** subpercurrent to long-excurrent, of *bryoides*-type.

Polyoicous. **Perigonia** gemmiform, axillary or rhizautoicous. **Perichaetia** terminal; **perichaetial leaves** with vaginant laminae open to half open. **Setae** to 5 mm long, yellow. **Capsules** ovate, asymmetrical, inclined, to 1 mm long; **exothecial cells** quadrate to short-rectangular, weakly collenchymatous. **Operculum** rostrate. **Peristome** of *bryoides*-type, reddish. **Spores** 9–17 µm diam.

Fissidens curvatus is a very variable moss in the size of the plants and width of the leaves. Typically, it is dimorphic, the sterile stems having smaller, more numerous and ±uniform leaves. Fertile plants are shorter, with terminal subperichaetial and perichaetial leaves much larger than the lower leaves. The species is among the most widespread of the genus.

Stone (1990c) placed the Australian *F. aristatus*, *F. sordidivirens*, *F. wildii* and *F. warningensis* (*nom. nud.)* in the synonymy of *F. pungens*, but later (Stone, 1994a) she recognised *F. aristatus* and *F. pungens* as distinct, primarily on the basis of plant size. *Fissidens curvatus* is a highly variable species with an extensive synonymy (Bruggeman-Nannenga & Pursell, 1995). The stems are often dimorphic, infertile or sterile stems being longer with a greater number of leaves than fertile (perichaetial) stems.

The small, narrow leaves and strong, yellowish border are useful identifying features.

Two varieties are known in Australia.

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 ('1853') [1855]. Type: Barossa Ra., S.A., *F.Mueller 3*; syn: BM; isosyn: MEL76168, *fide* I.G.Stone, *J. Bryol.* 16: 262 (1990); 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). Type: 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). Type: Mt Tui-Kio-San, western Schen-si, China, Sept. 1896, *J.P.Giraldi*; iso: FL *n.v.*

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

Fissidens aristatus Broth., *Proc. Linn. Soc. New South Wales* 41: 578 (1916), *fide* M.A.Bruggeman-Nannenga & R.A.Pursell, *Lindbergia* 20: 50 (1995). Type: Mossman's Bay Falls, N.S.W., on damp soil, *W.W.Watts 4584*; lecto: H-BR, *fide* I.G.Stone (1990a); isolecto: MEL, 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.

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

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

Fissidens liliputanobryoides Müll.Hal., *Gen. Musc. Frond.* 56 (1901), *nom. nud.*

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

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).

Illustrations: G.O.K.Sainsbury, *A Handbook of the New Zealand Mosses* pl. 6, fig. 3 (1955), as *F. pungens*; G.A.M.Scott & I.G.Stone, *The Mosses of 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, *J. Hattori Bot. Lab.* 48: 181, fig. 5 (1980), as *F. strictulum* (*sic*).

Plants small, 2–5 (–10) mm tall, usually dimorphic. **Sterile stems** with 8–12 pairs of leaves, ±uniform. **Leaves** oblong-lanceolate or linear-lanceolate, (0.5–) 0.75–1.50 (–2.0) mm long, 0.15–0.30 (–0.50) mm wide; **limbidium** strong, 2–4-stratose, usually confluent with the excurrent costa; **apex** acute, acuminate; **vaginant laminae** 1/2–3/4 leaf length, closed; **dorsal lamina** tapered to the base; **margins** entire. **Lamina cells** pellucid, firm- or thin-walled, ±hexagonal, 8–10 µm long, longer proximally.

Male plants gemmiferous, rhizautoicous or axillary at the base, occasionally separate. **Fertile stems** short or long; leaves in 2–10 pairs. **Perichaetial leaves** with vaginant laminae ±open. **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. **Calyptra** 0.40–0.55 mm long. **Spores** 9–15 µm diam.

Images

Widespread in all States and Territories and on Norfolk Island.

Grows on soil and rocks.

Also in southern U.S.A., Mexico, South America, Europe, South Africa, India, China, Japan, New Caledonia, New Zealand (including the Auckland Islands and Campbell Island).

Selected specimens examined: W.A.: Cape D'Entrecasteau, *D.G.Catcheside 74.172* (AD, PERTH). N.T.: Daly River, 13 Aug. 1952, *V.Pederson* (MEL). S.A.: Mount Crawford Forest, *D.G.Catcheside 78.238* (AD). Qld: Chimneys Creek 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); Newrybar, Richmond R., *W.W.Watts 2966* (NSW). 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).

Typical *F. curvatus* is usually dimorphic, the sterile stems having smaller, more numerous, ±uniform leaves. Fertile stems are shorter with terminal subperichaetial and perichaetial leaves much larger that the lower, ±uniform leaves. The synonyms cited above mostly represent longer plants than the typical form, usually fertile, and they do not always exhibit dimorphism. The holotype and isotypes of *F. sordidevirens* are 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 Queensland on soil banks in rainforest.

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

Fissidens aristatus was incorrectly reduced to synonymy of *F. pungens* (Stone, 1990a), but later reinstated (Stone, 1994a); Pursell *et al.* (1992) also regarded it as a synonym. It is usually a larger plant, often branching, and the perigonia differ in their position from those of the type variety. Stems and leaves 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 appears to be absent, and the plants are larger with lateral branches and sporophytes. Male inflorescences are more numerous, either sessile or on axillary rhizoids, frequently subtending a fertile innovation, sometimes terminating a lateral innovation, occasionally terminal on a separate 4–8 leaf pair plant. These forms appear to grow in very wet, muddy conditions and have so far only been found in north-eastern New South Wales near the Queensland border and in the Sydney region.

Stone (*ined.*) originally intended treating *F. aristatus* as a new variety of *F. curvatus*. This intention is not followed here and we agree with Bruggeman-Nannenga & Pursell (1995), who placed *F. aristatus* in synonymy of *F curvatus*.

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). Type: Christchurch, New Zealand, 1892, *Beckett*; holo: CHR-Beckett.

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

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

Sterile shoots to 8 mm tall. **Leaves** lax, in 12–15 pairs, the 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. 3/4 leaf length, c. half open; limbidium 4–5-seriate below, cells of outer row rectangular, broader and shorter; **dorsal lamina** broad above, narrowed below, ending above the base to slightly decurrent; limbidium absent or vestigial. **Lamina cells** thin-walled, ±quadrate to hexagonal, c. 6–12 ×6–10 µm, rectangular basally in vaginant laminae and 12–25 × 8–10 µm.

Fertile plants with 4–8 pairs of lanceolate leaves. **Perichaetial leaves** to 1.4 mm long and 0.3 mm wide; **limbidium** intermittent on dorsal lamina; **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, with an erect rostrum, c. 0.5 mm long. **Spores** 15.0–17.5 µm diam.

Images

Occurs in W.A., A.C.T., Vic. and Tas.

Also in New Zealand.

Selected specimens examined: W.A.: Pemberton, *I.G.Stone 23598* (MEL). A.C.T.: Gibraltar Ck valley, 27 km SE 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 with a vestigial or obsolete limbidium can be difficult to distinguish from *F. taylorii* Müll.Hal. Fertile plants are readily recognisable by the intermittent limbidium on the dorsal laminae and the asymmetrical capsules.

Bibliography