FISSIDENTACEAE

Fissidentaceae Schimp., *Coroll. Bryol. Eur.* 20 (1856)

Type: *Fissidens* Hedw.

Skitophyllaceae Mitt., *J. Linn. Soc. Bot.* 12: 11, 23, 580 (1869). Type: *Fissidens semicompletus* Hedw. (Lectotype designated by Pursell & Bruggeman-Nannenga, 2004).

Schistophyllaceae Lindb., *Utkast Eur. Bladmoss* 16 (1868), *nom. inval. incl. fam. prior*.

Archifissidentaceae Dixon & P.de la Varde, *in* P. de la Varde, *Arch. Bot. Mém.* 1(3): 23 (1927), *nom. inval.*; Nanobryaceae Schultze-Motel, *Willdenowia* 5: 386 (1969). Type: *Nanobryum dummeri* Dixon.

Plants acrocarpous. **Stems**, except for initial stages, growing from a 2-sided apical cell. **Leaves** distichous, equitant, each consisting of 2 vaginant laminae clasping the stem, a ventral and dorsal lamina (except *Nanobryum*); **costa** single, usually well-developed, sometimes reduced or absent or nearly so. **Peristome** single, haplolepidous, endostomate, rarely absent; teeth 16, usually divided 1/2–2/3 their length, rarely undivided or irregularly divided or reduced.

The family has been previously divided into a number of segregate genera, but it is now usual to treat all in a single genus, *Fissidens*, which has been variously divided into subgenera and sections. Around 900 species names are listed in *Index Muscorum*, with more than 450 species currently accepted (Crosby *et al.*, 2000) and together having an almost world-wide distribution, except for high Arctic and Antarctic regions. The greatest species diversity is found in the tropics.

Since the original manuscript was prepared for Australian *Fissidens*, there have been significant taxonomic changes at the subgeneric level and in species synonymy. Some 57 species and 16 infra-specific taxa of *Fissidens* are reported here from the mainland States and Territories of Australia, nine species and four varieties are apparently endemic, and many are restricted to coastal Queensland which has, historically, been the primary focus of collectors in Australia. Plants can be erect or ±prostrate, scattered or gregarious, occasionally forming dense turves or cushions, terrestrial, rupestral, epiphytic, on soil, rock or bark, occasionally aquatic. Some species are important colonisers of bare soil, particularly roadside banks and even termite mounds.

Fissidentaceae is characterised by the peculiar leaf structure (Illustration) which is essentially isobilateral (not dorsiventral as in most other mosses) and for which there have been several explanations that were fully discussed by Salmon (1899) and, more recently, by Robinson (1970). The most widely accepted interpretation (supported by Salmon) dates back to Robert Brown (1819) who proposed that the vaginant laminae represent the true leaf, with the addition of apical and dorsal appendicular outgrowths. Another theory, initiated by Spruce (1881), suggests that the whole *Fissidens* leaf constitutes the true leaf, the apical and dorsal laminae being the middle lobe of a trilobed leaf turned on its axis. Robinson (1970) elaborated on this by suggesting that a mutation caused a change in the mitotic spindle of the leaf primordium resulting in reorientation of the upper part of the leaf.

Relationships of the Fissidentaceae appear to be with the Dicranaceae (Bruggeman-Nannenga & Berendsen, 1990; La Farge *et al.*, 2000; Buck & Goffinet, 2000). While both families share similar peristomes, the primary difference is in leaf structure. However, the peristome of *F. taylorii* var. *sainsburiana* is also similar to that found in some Grimmiaceae. The phylogenetic position of the Nanobryaceae, originally treated in this Flora as distinct, is perhaps equivocal. Pursell & Reese (1980) synonymised Nanobryaceae in Fissidentaceae and *Nanobryum* in *Fissidens*, a position supported by Bruggeman-Nannenga & Berendsen (1990). Stone (1982) argued strongly for the retention of the genus *Nanobryum* for those species lacking a "*Fissidens*-type" leaf (*N. dummeri* and *N. thorsbornei*). At least *N. thorsbornei* shares the limbate dorsal and apical laminae composed of large, smooth cells and features of

Bibliography

the peristome with *Fissidens* sect. *Fissidens*. In the present treatment, Nanobryaceae and *Nanobryum* are treated as belonging to Fissidentaceae and *Fissidens*, respectively.

The family Archifissidentaceae Dixon & P. de laVarde, *nom. illeg.* was replaced by the Nanobryaceae Schultze-Motel (Schultze-Motel, 1969) with a single species, *Nanobryum gladiolum* (Mitt.) Bizot [= *N. duemmeri* Dixon (*dummeri*) *fide* Bizot, 1963] from Uganda and Cape Province, South Africa. The Archifissidentaceae was established to accommodate *Nanobryum* as an ancestral form of *Fissidens*. However, the family is based on two character states, *viz.* linear to linear-rhomboid lamina cells and a persistent protonema.

Based on morphological variation within *Fissidens* and *Nanobryum*, Pursell & Reese (1980) reduced Nanobryaceae to synonymy of Fissidentaceae and *Nanobryum* to synonymy of *Fissidens*. Iwatsuki & Suzuki (1989) apparently did not accept the transfer and reported *Nanobryum thorsbornei* from New Caledonia. Bruggeman-Nannenga & Berendsen (1988) agreed with Pursell & Reese (1980) and discounted the importance of the lack of dorsal and apical laminae in *Nanobryum*, placing greater emphasis on the *bryoides*-type peristome ornamentation which they suggested was found only in *Fissidens*. However, they acknowledged that the *fasciculatus*-type peristome was also found in genera of the Dicranales, as well as in *Fissidens*.

Stone (1982, 1990c) provided a cogent argument for the retention of *Nanobryum* and the family Nanobryaceae. Clearly, confusion persists around the placement of this minute and morphologically somewhat anomalous moss. Stems and leaves of very young plants or very short-stemmed species of *Fissidens* are often different to typical longer-stemmed forms. Molecular genetic studies may provide corroborative evidence for the retention of Nanobryaceae and *Nanobryum* or their retention in Fissidentaceae and *Fissidens*, respectively.

However, placing greater emphasis on peristome structure, *N. thorsbornei* is included here in *Fissidens*.

There have been two recent critical evaluations of the subgenera and sections of *Fissidens*. Pursell & Bruggeman-Nannenga (2004) recognise four subgenera, based on gametophyte and sporophyte characters: *Aloma*, *Fissidens* (with Sections *Fissidens* and *Sarawackia*), *Octodiceras* and *Pachyfissidens* (with Sections *Amblyothallia*, *Crispidium* and *Pachyfissidens*). A second infrageneric classification (Suzuki & Iwatsuki, 2007) utilises morphological characters of the gametophytes and peristome teeth as well as cytotaxonomic evidence relating to sexuality. Those authors recognised six subgenera: *Fissidens* (with Sections *Fissidens*, *Semilimbidium* and *Aloma*); *Aneuron*; a new subgenus *Neoamblyothallia* (with Sections *Neoamblyothallia* and *Crispidium*); *Pachyfissidens* (with Sections *Pachyfissidens* and *Serridium*); *Octodiceras*; and *Sarawakia*.

In this treatment we have accepted the subgeneric division proposed by Pursell & Bruggeman-Nannenga (2004) with slight modification after Suzuki & Iwatsuki (2007). Several rearrangements of species in different sections have led to some confusion in the placement of species, and it is probable that future morphological and molecular phylogenetic comparison will result in further rearrangement.

Peristome characters were studied by Fleischer (1904) who recognised two types in which the filaments (forks) were, respectively, spirally thickened or papillose. Following scanning electron microscopic (SEM) observations, Allen (1980) recognised seven distinct types that were only partly correlated with the sections of *Fissidens* subg. *Fissidens*. Bruggeman-Nannenga & Berendsen (1990) investigated many species, including 28 identified as Australian (some by SEM, but most by light microscopy) and distinguished five basic types (Illustration). They also recognised several other types of peristome found in very few species and not characteristic of any section, and they alluded to the potential taxonomic use of the number of columns of exothecial cells around mid-capsule. Thus, the *scariosus*-type peristome is correlated with (28–) 32 (–40) columns of exothecial cells around the capsule periphery while other peristome types usually have more than 40.

Bibliography

Key to main peristome types

[Adapted from Bruggeman-Nannenga & Berendsen (1990) and Suzuki & Iwatsuki (2007)]

1 Peristome teeth usually divided into 2 equal filaments above; trabeculae distinct throughout the filament; teeth broad and flat; lamellae of the abaxial (outer) side of filaments with rather high oblique riblets .....***taxifolius*-type**

1: Peristome teeth divided above or not; trabeculae not distinct in the distal part of the filament; teeth various.....2

2 Trabeculae of abaxial side in undivided basal part of tooth higher than lamellae 3

2: Trabeculae and lamellae of abaxial side in undivided part of tooth approximately equal in height 4

3 Trabeculae of abaxial side at bifurcation coarsely papillose, double at the margins, not forked; distal part of filament appearing spirally thickened (actually oblique riblets on abaxial and adaxial surfaces) ... .***bryoides*-type**

3: Trabeculae of abaxial side at bifurcation smooth and double with forked ends; distal part of filament with irregular squamae or spikes ..... ***zippelianus*-type**

4 Distal part of peristome teeth entire, rimose or occasionally weakly split; distal part coarsely and irregularly papillose..... ***sainsburia*-type**

4: Distal part of peristome teeth split into 2 filaments; filaments appearing spirally ornamented or with deflexd squamae..... 5

5 Distal part of filament spirally ornamented; abaxial surface at the bifurcation with trabeculae, and marginal vertical walls forming a continuous smooth ridge with rounded corners .....***scariosus*-type**

5: Distal part of filament with deflexed squamae; abaxial side at the bifurcation lacking marginal vertical walls; lamellae with vertical striae, often papillose..... ***similiretis*-type**

Costal structure

Stone (1990b) and Bruggeman-Nannenga (1990) independently studied the costal structure of *Fissidens* species in relation to classification and the latter defined the following main types using transverse sections of the costa in the mid-region of vaginant laminae of vegetative leaves (Illustration):

***oblongifolius*-type**, with 4 or more large guide cells in a U- or V-shape with 1–5 large central cells in 1–3 rows connecting to the dorsal lamina; an adaxial and 2 lateral bands of stereids or substereids; epidermal cells differentiated or not; junction of vaginant laminae and costa formed of laminal cells.

***taxifolius*-type**, with 2–4 or more superficial, adaxial guide cells and 1–8 central connecting cells in 1 or 2 rows or a random mass; 2 lateral stereid or substereid bands; epidermal cells with broader lumina; junction of vaginant laminae and costa formed of guide cells and stereids.

***bryoides*-type**, typically with 2 superficial adaxial guide cells and 1 large central connecting cell (always between the 2 guide cells) and occasionally more cells between this and the dorsal lamina; 2 lateral bands of stereids or small cells; epidermis differentiated or not; junction of vaginant laminae and costa formed of laminal cells.

Illustrations in Stone (1990b) demonstrate that the arrangement of the large central cells (which are morphologically similar to guide cells) in either 1 or 2 rows (occasionally a random mass) in the simple upper part of the leaf above the vaginant laminae matches that of the large connecting cells in the sheathing region.

Throughout this treatment of the family, the dimensions provided are of well-soaked plants: ‘minute’ plants are up to 3 mm tall; ‘small’ plants 3–10 mm; ‘medium-sized’ plants 10–20 mm; and ‘large’ or ‘robust’ plants more than 20 mm tall or long. Unless stated otherwise, cell details are for those from the mid-dorsal lamina opposite the junction of the vaginant laminae in a mid-stem (vegetative, not perichaetial) leaf; exothecial cell details are for those in mid-theca; costal structure refers to mid-vaginant lamina region: in ‘dorsal lamina tapered to the base’, the base refers to the leaf base; where the vaginant laminae are unequal, ‘minor’ lamina refers to the smaller of the two. Some species of *Fissidens* are dimorphic, the fruiting

plants being quite different in appearance from the vegetative plants, e.g. *F. curvatus*. Fruiting plants usually have short stems bearing a few pairs of juvenile leaves at their base. These leaves grade into larger subperichaetial and perichaetial leaves which surround a sporophyte at the stem apex, where further leaf production has ceased. Strictly vegetative leaves can be confined to a single pair on such plants, or they can even be completely lacking. Vegetative plants, on the other hand, after producing juvenile leaves at the stem base, can produce many pairs of vegetative leaves. These are uniform in size and smaller than perichaetial leaves.

Microscopic examination of specimens

Cell shape and size, limbidia (particularly where confined to the proximal part of the vaginant laminae), cell structure and surface ornamentation, costal structure and stem sections are best observed using cleared preparations. Whole moist leaves and thin hand-cut sections are mounted under a coverglass on a microscope slide and undiluted lactic acid carefully infiltrated under the coverglass before warming the preparation carefully and gently over a spirit lamp flame. This removes cellular contents and makes for much easier observation of critical structures, particularly surface papillae and mammillae or other wall thickening. Subsequent infiltration of an 0.5% Toluidine Blue O solution can enhance visibility after clearing tissues and sections. Another potentially useful aid to the identification of some taxa, although not employed here, is to observe the colour reaction of moist leaves to potassium hydroxide (KOH 10% solution), a technique that has proven to be particularly useful in Pottiaceae (Zander, 1993).

Bibliography

FISSIDENS

Fissidens Hedw., *Sp. Musc. Frond.* 152 (1801); from the Latin *fissio* (a split or cleft) and *dens* (a tooth), referring to the divided peristome teeth of most species.

Lectotype: *F. bryoides* Hedw., *fide* E.G.Britton, *in* N.L.Britton, *Fl. Bermuda* 435 (1916).

Plants usually minute (1–3 mm long) to medium-sized, or more than 10 cm (aquatic species). **Stems** simple or branched, growing from a 2-sided apical cell, except at the earliest stage; **rhizoids** smooth. **Leaves** distichous, complanate, equitant, linear to lanceolate, plain to falcate; complex in form, consisting of 2 vaginant laminae clasping the stem and joined only along the costa (vaginant lamina open), or joined above from the costa to the margin (vaginant lamina closed), or with the minor lamina joining by a shorter suture extending part way to the margin (part open); apical lamina above the vaginant lamina small or large; dorsal (abaxial) lamina extending the length of the leaf, reaching the leaf base, or ending above, or rarely decurrent; **cells of apical and dorsal lamina** thin- to thick-walled, smooth, mammillose, uni- or multipapillose, the surface flat to strongly bulging, sometimes lenticularly (convexly) thickened, usually small, isodiametric, occasionally longer (especially near the leaf base); **cells of vaginant lamina** often larger, more elongate or broader proximally; **marginal cells** differentiated or not; **costa** single, usually well-developed, failing below the apex to short-excurrent, sometimes reduced, absent or nearly so.

Dioicous or **monoicous**. **Perigonia** terminal or lateral. **Perichaetia** terminal, rarely lateral; **perichaetial leaves** often longer and/or narrower than vegetative leaves, the vaginant lamina open. **Setae** smooth, infrequently papillose or scabrous, mostly elongate, erect, often geniculate at base. **Capsules** erect to inclined, cylindrical, symmetrical or asymmetrical. **Operculum** conical and apiculate to rostrate. **Peristome** single, endostomate, of 16 teeth, these usually divided to 1/2–2/3 length (rarely entire to rimose), the arms filamentous. **Calyptra** cucullate, rarely mitrate.

Fissidens was divided into several subgenera by Müller (1849) and, subsequently, into sections (Müller, 1901). These were adopted by Brotherus (1924) and emended by Norkett, as described by Gangulee (1971). Bruggeman-Nannenga (1978) made some refinements, and Iwatsuki & Inoue (1984) and Iwatsuki (1985) added two subgenera, including *Serridium* which included species occurring in Australia. *Fissidens* subg. *Serridium* was re-evaluated by Bruggeman-Nannenga *et al.* (1994), and sect. *Amblyothallia* was transferred from subg. *Fissidens*. Further proposals by Pursell (1988) concerning the circumscription of subg. *Fissidens* have also been made. The subgeneric divisions are based primarily on gametophyte characters, but peristome attributes correlate reasonably well.

In their most recent reappraisal of the subgenera, Pursell & Bruggeman-Nannenga (2004) include only five subgenera: Section *Aloma* was elevated to subgenus and contains the greatest number of species in the genus (thanks to the number of multipapillose species); Subgenus *Serridium* was relegated to subg. *Pachyfissidens* sect. *Pachyfissidens* on the basis of costal anatomy and peristome structure; Section *Semilimbidium* was subsumed in subgen. *Aloma*; Section *Amblyothallia* of subgen. *Serridium* was subsumed in subgen. *Pachyfissidens* sect. *Pachyfissidens*; Section *Crenularia* of subgen. *Fissidens* was subsumed in subgen. *Aloma*; and Section *Areofissidens* was also subsumed in subgen. *Aloma*. Four subgenera of *Fissidens* are represented in Australia: *Aloma* (the largest), *Fissidens*, *Octodiceras* and *Pachyfissidens*.

Subgenus ALOMA Kindb., *Eur. N. Amer. Bryin*. 2: 165 (1897)

Plants light to sordid green, sometimes with a reddish tinge, particularly the stem and leaf costa, terrestrial, infrequently aquatic, small to medium-sized. **Stems** monomorphic, unbranched or branched; in section a central strand present or absent. **Leaves** imbricate or distant, usually pinnately arranged, occasionally palmate; **margins** ±entire, **limbate** or occasionally elimbate, **limbidium** on all laminae or ±confined to vaginant laminae, marginal

Bibliography

or intralaminal, occasionally inconspicuous, unistratose or rarely multistratose. **Costa** variable in length, sometimes absent or nearly so, when present of *bryoides*-type. **Lamina cells** distinct or obscure, with or without oil droplets, unistratose to irregularly or regularly bistratose, small to large, firm-walled or large and inflated, thin-walled and collapsing when dry, smooth, mammillose, uni- or multipapillose.

Monoicous; **Perigonia** variable in position. **Perichaetia** terminal on main stems and branched, occasionally with axillary naked antheridia and archegonia. **Sporophytes** 1–6 per perichaetium, yellow, darkening with age; **setae** mostly elongate; **capsules** usually exserted, mostly erect and radially symmetrical, stomatose; **exothecial cells** in c. 32 columns, ±quadrate, the vertical walls thicker than horizontal walls, usually collenchymatous. **Peristome** of *scariosus*-type, rarely anomalous. **Calyptra** cucullate, rarely mitrate, usually smooth, rarely prorate.

Subgenus FISSIDENS Hedw., *Sp. Musc. Frond*. 152 (1801)

Plants light green to blackish green, terrestrial or aquatic. **Stems** monomorphic or dimorphic, unbranched or branched, in section a central strand present or absent. **Leaves** ±crispate when dry, usually imbricate, in few to several pairs, mostly pinnately arranged; **margins** variable, typically **limbate** on all laminae or occasionally (e.g. *F. taylorii*) confined to vaginant laminae, occasionally absent from some or all leaves; **limbidium** uni- to multistratose. **Laminal cells** medium-sized, plane or convex, firm-walled, with smooth evenly thickened walls (occasionally lenticularly thickened), smooth, often bulging, distinct to obscure, irregularly quadrate to hexagonal, unistratose to irregularly or regularly bistratose; **costa** of *bryoides*-type, with 2 large adaxial and 1 or more large central cells.

Monoicous. Sporophytes 1–several per perichaetium; **setae** usually elongate; **capsules** usually exserted, erect, radially symmetrical to ±inclined to ±arcuate, bilaterally symmetrical, stomatose; **exothecial cells** ±quadrate to oblong, the vertical walls thicker than horizontal walls, often collenchymatous, in 40 or more columns around mid-capsule diameter. **Peristome** of *bryoides*-type, sometimes anomalous. **Operculum** conical, usually short-rostrate. **Calyptra** cucullate, infrequently mitrate, usually smooth or occasionally prorate. **Spores** smooth to finely papillose.

Subgenus OCTODICERAS (Brid.) Broth., *Nat. Pflanzenfam.* 1(3): 361 (‘1900’) [1901]

Plants yellowish to dark green, large, aquatic, submerged but often periodically emergent, delicate. **Stems** to 12 cm or more long, usually much-branched, flaccid, lacking a central strand. **Leaves** numerous, usually distant, long and narrow, lanceolate to linear-lanceolate; apex acute; lamina unistratose, the margins ±entire, elimbate to weakly limbate on lower 1/3 of vaginant laminae; **costa** ending near the apex or well below, *bryoides*-type; **vaginant laminae** acute, ±equal, ending on or near the costa; **dorsal lamina** reaching to insertion or ending above. **Lamina cells** unistratose or infrequently and irregularly bistratose, firm-walled, smooth, flat or slightly bulging, quadrate to short-rectangular or hexagonal.

Monoicous. **Perigonia** and **perichaetia** gemmiform, axillary or terminal on main stem and elongated axillary branches; sporophytes 1 or more per perichaetium, small, inconspicuous. **Setae** short. **Capsules** erect, usually exserted, radially symmetrical. **Operculum** conical, short-rostrate, occasionally long-rostrate. **Peristome** reduced *bryoides*-type, undivided or divided; filaments infrequently absent. **Calyptra** mitrate or cucullate, smooth.

Subgenus PACHYFISSIDENS (Müll.Hal.) Kindb., *Eur. N. Amer. Bryin*. 2: 165 (1897)

Plants small to large, erect to decumbent, light to dark green. **Stems** usually branched, in section a central strand usually present, occasionally absent. **Leaves** usually imbricate, pinnately arranged, oblong to lanceolate; **margins** often irregularly, coarsely and distantly serrate distally, **elimbate** or weakly **limbate** on proximal parts of vaginant laminae. **Costa** ending several cells below the apex to short-excurrent, rarely obscured by overlapping chlorophyllous cells, in section of *oblongifolius*- or *taxifolius*-type. **Lamina cells** unistratose,

bistratose, rarely multistratose, firm-walled, the walls evenly thickened, mostly somewhat bulging, smooth, plane, infrequently mammillose or multipapillose, irregularly quadrate to irregularly hexagonal.

Monoicous or **dioicous**. **Perigonia** mostly gemmiform, basal, axillary, rarely terminal on epiphyllous dwarf males, infrequently terminal on longer stems. **Perichaetia** terminal on short axillary branches, rarely terminal on main stems. **Sporophytes** usually 1 per perichaetium, reddish; **setae** elongate, reddish or yellow, darkening with age; **capsules** immersed or exserted, erect, radially symmetrical or somewhat inclined, slightly arcuate, bilaterally symmetrical, mostly stomatose; **exothecial cells** in more than 40 columns around mid-capsule diameter, mostly oblong, the vertical walls thinner than horizontal walls. **Operculum** conical, long-rostrate. **Peristome** of *taxifolius*-, *similiretis*- or *zippelianus*-type. **Calyptra** cucullate, smooth, covering only the rostrum. **Spores** finely papillose to smooth.

Three sections of Subgenus *Pachyfissidens* are recognised:

Sect. *Pachyfissidens*

Sect. *Amblyothallia* Müll.Hal.

Sect. *Crispidium* Müll.Hal.

Synopsis

Fissidens Hedw., *Sp. Musc. Frond*. 152 (1801)

Subgen. *Aloma* Kindb., *Eur. N. Amer. Bryin*. 2: 165 (1897)

F. altisetus Dixon, *F. angustifolius* Sull., ?*F. autoicus* Thér. & Dixon, *F. badyinbarus* I.G.Stone & Catches., *F. beckettii* Mitt., *F. biformis* Mitt., *F. bogoriensis* M.Fleisch., *F. brassii* E.B.Bartram, *F. ceylonensis* Dozy & Molk., *F. cucullatus* I.G.Stone, *F. cuspidiferus* Dixon, *F. darwinianus* Catches. & I.G.Stone, *F. dealbatus* Hook.f. & Wilson, *F. elegans* Brid., *F. flabellulus* Thwaites & Mitt., *F. gardneri* Mitt., *F. gymnocarpus* I.G.Stone, *F. henryae* I.G.Stone, *F. hollianus* Dozy & Molk., *F. hyalinus* Hook.f. & Wilson, *F. inaequiretis* I.G.Stone, *F. integerrimus* Mitt., *F. intromarginatulus* E.B.Bartram, *F. linearis* Brid., *F. flaccidus* Mitt., *F. oblatus* I.G.Stone & Catches., *F. pallidinervis* Mitt., *F. pellucidus* Hornsch., *F. perobtusus* Dixon, *F. perpusillus* Wilson ex Mitt., *F. serratus* Müll.Hal., *F. strictus* Hook.f. & Wilson, *F. submarginatus* Bruch, *F. tenellus* Hook.f. & Wilson, *F. victorialis* Mitt., *F. zollingeri* Mont.

Subgen. *Fissidens* Hedw., *Sp. Musc. Frond*. 152 (1801)

Sect. *Fissidens*

F. bryoides Hedw., *F. crenulatus* Mitt., *F. curvatus* Hornsch., *F. dietrichiae* Müll.Hal., *F. diversifolius* Mitt., *F. leptocladus* Müll.Hal. ex Rodway, *F. megalotis* Schimp. ex Müll.Hal., *F. perangustus* Broth., *F. rigidulus* Hook.f. & Wilson, *F. taylorii* Müll.Hal., *F. thorsbornei* (I.G.Stone) Brugg.-Nann.

Subgen. *Octodiceras* (Brid.) Broth., *Nat. Pflanzenfam*. 1(3): 361 (‘1900’) [1901]

F. berteroi (Mont.) Müll.Hal.

Subgen. *Pachyfissidens* (Müll.Hal.) Kindb., *Eur. N. Amer. Bryin*. 2: 165 (1897)

Sect. *Pachyfissidens*

F. adianthoides Hedw.

Sect. *Amblyothallia* Müll.Hal., *Gen. Musc. Frond.* 63 (1901)

F. asplenioides Hedw., *F. oblongifolius* Hook.f. & Wilson, *F. pallidus* Hook.f. & Wilson, *F. pseudopallidus* I.G.Stone, *F. sufflatus* I.G.Stone, *F. wattsii* Broth.

Sect. *Crispidium* Müll.Hal., *Gen. Musc. Frond.* 64 (1901)

F. crispulus Brid.