BRYOPHYTES of Australia

Funariaceae SchwÃ¤gr.

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Funariaceae SchwÃ¤gr.

Allan J. Fife & Rodney D. Seppelt

Autoicous, less commonly paroicous, rarely synoicous or polygamous. Plants minute to medium-sized, lacking a persistent protonema, growing on soil, usually gregarious. Stems unbranched or branched sympodially by innovations, rarely forked, not forming rhizomes, usually reddish brown and with a central strand, 1–4 thick-walled cortical cell layers and a hyaloderm (T.S.). Rhizoids smooth, reddish brown, rarely cerise and rarely bearing tubers. Leaves usually larger and more crowded above, soft, concave or less commonly plane, erect-spreading or, rarely, erect, usually obovate, less often elliptic, lanceolate or subulate, entire or serrate by projecting cell ends, rarely ciliate, acuminate to obtuse; costa single, usually strong, protruding on the abaxial surface, with a small (rarely large) central stereid group surrounded by 1 abaxial and 1 or 2 adaxial layers of larger cells. Laminal cells smooth, large, thin-walled and oblong-hexagonal, rarely firm-walled and oblong, usually thinner-walled and more oblong below, occasionally narrowly oblong at the margins and forming a border. Axillary filaments present, with elongate-cylindrical terminal cells.

Perigonium terminal, usually single, rarely lacking, with multicellular paraphyses that have globose or pyriform yellowish terminal cells. Perichaetial shoot arising by subperigonial innovation and overtopping the perigonium; perichaetium terminal, lacking differentiated paraphyses. Calyptra deciduous or persistent, usually smooth, rarely papillose, mitrate or cucullate, usually strongly rostrate and inflated at the base, rarely angled or pleated. Capsules immersed to long-exserted, erect or curved, often strongly asymmetrical, operculate or not, usually with a distinct neck; stomata present, restricted to the neck, consisting of an elongate pore in a single guard cell (‘doughnut’ stomata), immersed or superficial; annulus present or absent; exothecial cells thin-or thick-walled; radial walls occasionally cuneate in cross-section. Peristome single, double, rudimentary or absent; exostome teeth sigmoid or straight, sometimes apically fused as a latticed disc, papillose-striolate or striate, trabeculate on the adaxial surface; endostome lacking cilia; segments coherent at the base, opposite the teeth, acute or irregular, papillose-striolate or papillose. Spores small (c. 10 µm) to very large (c. 80–90 µm), subreniform or, rarely, ellipsoidal, reddish or golden-brown, variously ornamented.

Funariaceae is characterised by gametophyte characters such as autoicous or paroicous sexuality, usually obovate leaves with thin-walled non-ornamented cells and perigonial paraphyses with inflated terminal cells. Distinctive sporophytic attributes include the ‘doughnut’ stomata enclosed by a single guard cell, endostome segments lying opposite the exostome teeth, and a usually inflated calyptra.

Distribution: This family of 16 genera of short-lived, weedy, soil-inhabiting mosses has a global distribution (Fife, 1982, 1985; Goffinet *et al.*, 2012).

All five genera in the current treatment, as well as 11 species and infraspecific taxa, are common to Australia and New Zealand. New Zealand also has an endemic genus, *Bryobeckettia* Fife (Fife, 1985).

Nomenclature And Typification: Funariaceae Schwägr., *Syn. Musc. Frond.* 43 (1830), as *Funariae*. Type: *Funaria* Hedw.

Taxonomic Notes: The Funariaceae, in contrast to most other groups of mosses, exhibits gametophytic uniformity and sporophytic plasticity. It is characterised by a suite of traits but largely excluding those of the peristome. Genera, and even species, are primarily circumscribed by sporophytic characters, occasionally with reference to the peristome.
Major taxonomic problems have been encountered in *Funaria* and *Entosthodon*, and there are still many poorly understood intermediate forms. Similarly, the taxa of *Goniomitrium*, with comparatively unstable costal characters, can be difficult to define.

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Images

Fig. 1: '*Goniomitrium acuminatum*' by Fagg, M. (© Fagg, M.)

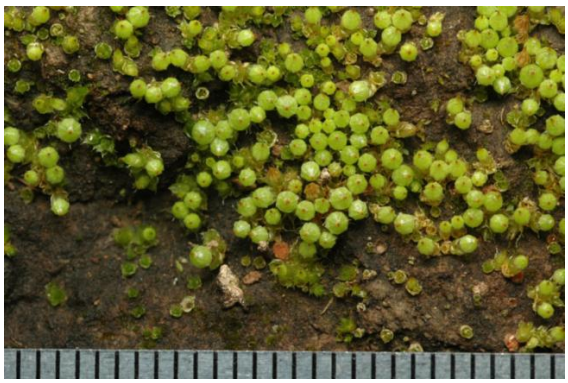

Fig. 2: '*Goniomitrium acuminatum subsp. enerve*' by Fagg, M. (© Fagg, M.)

Fig. 3: '*Funaria hygrometrica*' by Fagg, M. (© Fagg, M.)

Fig. 4: '*Funaria hygrometrica*' by Fagg, M. (© Australian National Botanic Gardens)

Fig. 5: '*Funaria hygrometrica*' by Fagg, M. (© Fagg, M.)

Fig. 6: '*Entosthodon subnudus var. gracilis*' by Fagg, M. (© Fagg, M.)

Fig. 7: '*Goniomitrium acuminatum*' by Fagg, M. (© Fagg, M.)

Fig. 8: '*Entosthodon subnudus var. gracilis*' by Fagg, M. (© Fagg, M.)

Fig. 9: '*Funaria hygrometrica*' by Fagg, M. (© Director of National Parks)

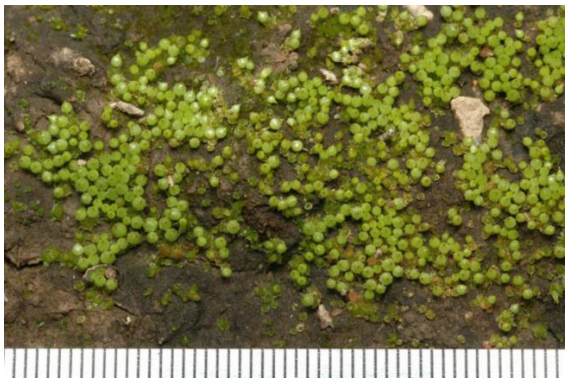

Fig. 10: '*Goniomitrium acuminatum*' by Fagg, M. (© Australian National Botanic Gardens)

Fig. 11: '*Funaria hygrometrica*' by Fagg, M. (© Australian National Botanic Gardens)

Fig. 12: '*Funaria hygrometrica*' by Fagg, M. (© Australian National Botanic Gardens)

Fig. 13: '*Physcomitrium pyriforme*' by Lepp, H. (© Lepp, H.)

Fig. 14: '*Goniomitrium acuminatum*' by Fagg, M. (© Australian National Botanic Gardens)

Fig. 15: '*Goniomitrium acuminatum*' by Fagg, M. (© Australian National Botanic Gardens)

Fig. 16: '*Funaria hygrometrica*' by Fagg, M. (© Fagg, M.)

Fig. 17: '*Funaria hygrometrica*' by Fagg, M. (© Australian National Botanic Gardens)

Fig. 18: '*Funaria hygrometrica*' by Fagg, M. (© Fagg, M.)

Fig. 19: '*Funaria hygrometrica*' by Fagg, M. (© Fagg, M.)

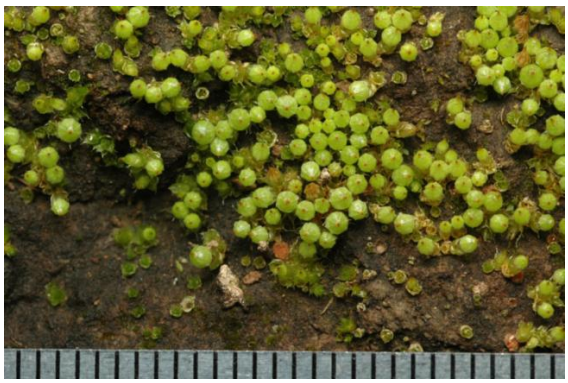

Fig. 20: '*Goniomitrium acuminatum*' by Fagg, M. (© Australian National Botanic Gardens)

Flora of Australia: Mosses Funariaceae key

From: **Fife, A.J. & Seppelt, R.D.** (2012).

1	Stems to 2 mm tall; capsules immersed, with very short setae (< 1 mm long)	2
1	Stems more than 2 mm tall; capsules exserted on elongate setae	3
2	Capsules operculate; spores ellipsoidal, 60–100 µm in greater diam.; calyptra with 8 radial pleats, 8-lobed at the base, covering the immature capsule	Goniomitrium
2	Capsules inoperculate; spores subreniform, 25–40 µm diam.; calyptra unlobed or rarely slightly lobed at the base, covering only the rostrum of the capsule	Physcomitrella
3	Capsules inclined and asymmetrical, sulcate when dry; peristome double; teeth strongly sigmoid, fused at apex by a lattice disc	Funaria
3	Capsules erect and symmetrical, not sulcate when dry (but often with the neck wrinkled); peristome double, single or absent; teeth (if present) not fused at apex	4
4	Operculum with a stout to slender rostrum; peristome absent; exothecial cells isodiametric; calyptra mitrate-rostrate	Physcomitrium
4	Operculum plane, convex or conical, not or very slightly rostrate; peristome present or absent; exothecial cells linear-oblong, oblong or, very rarely, isodiametric; calyptra cucullate-rostrate	Entosthodon

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