

LEPTOSTOMACEAE

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Leptostomaceae Schwägr., in C.L. von Willdenow, *Sp. Pl.* 5(2): 85 (1830); often cited incorrectly as “Leptostomataceae”.

Type: *Leptostomum* R.Br.

Dioicous. Plants small to moderately robust, growing in vivid green to dull green cushions matted by a dense dark brown to rust-red tomentum to form a hard corky pad. Stems erect, simple or branched, held together by a thick tomentum of rhizoids that are dimorphic and either thicker and with a coarsely papillose-scaly surface, or finer and almost smooth. Leaves erect and ±twisted around the stem or erect-spreading when dry, erect-spreading when moist, oblong-oval to ovate, broadly rounded to emarginate or broadly acute, abruptly piliferous; margin entire or rarely somewhat serrulate near apex, when dry mostly reflexed to revolute, unbordered; costa prominent at back, excurrent in a hyaline hairpoint or rarely ending below hairpoint; laminal cells subquadrate or rounded-hexagonal and firm to thick-walled or, less commonly, hexagonal and thin-walled, smooth, somewhat longer and broader towards the base, often thick-walled in the recurved marginal region, not differentiated in the alar region.

Perichaetia and perigonia terminal and filiform. Calyptra pale brown, slenderly cucullate, smooth, glabrous. Setae elongate, smooth. Capsules erect or ±inclined, sometimes curved or asymmetrical, oblong-oval or long-symmetrical, small-mouthed, with the neck broadly or long-tapered to the seta, smooth; operculum dome-like or rarely ±flat, not or only minutely apiculate; stomata numerous in neck, superficial. Peristome diplolepidous, double, brilliant white, often fragile or reduced; exostome teeth very short, smooth or papillose; endostome a small membrane; sometimes the exostome and endostome rudimentary and fused. Spores papillose with large hollow processes.

A monotypic family of eight species, Leptostomaceae is Gondwanan in origin and is distributed from the southern tip of South America to New Zealand and Australia northward through New Guinea, the Celebes and Java to Sri Lanka. Three non-endemic species occur in Australia.

The genus *Leptostomum* has variously been placed in the Bryaceae (Mitten, 1860; Andrews, 1951; Ochi, 1972) or in Leptostomaceae (Bryiineae) close to Bryaceae and Mniaceae and near the Bartramiineae (e.g. Brotherus, 1924; Vitt, 1984). Scanning electron microscopy of spores support a closer relationship with Bartramiineae rather than Bryiineae (Sorsa, 1976), while Ramsay (1983) saw a possible relationship to Mniaceae based on chromosome number (not supported by the superficial stomata); however $n = 6$ could also indicate the Bartramiineae. Chromosome number and spore characteristics together with cell structure and other attributes have led a number of taxonomists to accept ties to the Bartramiineae, a decision supported by Crum (1992) and followed in the current treatment.

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LEPTOSTOMUM

Leptostomum R.Br., *Trans. Linn. Soc. London* 10: 320 (1811), *nom. cons.*; from the Greek *lepto-* (small) and *stomas* (a mouth), in reference to the narrow mouth of the capsule.

Lecto: *L. inclinans* R.Br.

Helmsia Bosw., *J. Bot.* 32: 82 (1894). T: *H. collina* Bosw. [= *Leptostomum macrocarpon* (Hedw.) Bach.Pyl.]

Plants conspicuously matted together to form a characteristic hard corky tomentum. Leaves piliferous, unborded; margin recurved; laminal cells small, almost isodiametric to short-rectangular. Capsules generally erect, with a short to long neck with superficial stomata and a narrow mouth with a convex or dome-like operculum; annulus absent or poorly developed.

Species are often epiphytic on tree trunks and shrubs, but they can also occur on rock in closed forest (rainforest or wet-sclerophyll forest) and in riparian habitats.

- 1 Hairpoints of uppermost vegetative and perichaetial leaves ciliate-branched and, when dry, flexuose-crisped; laminal cells thin-walled, the contents conspicuously stellate-shrunken when dry..... **3. L. macrocarpon**
- 1: Hairpoints simple, not especially flexuose when dry; laminal cells thick-walled, the contents not noticeably shrunken when dry.....2
- 2 Hairpoints of vegetative leaves elongate; margin broadly and strongly revolute; leaf apex entire, symmetrical; cells 10–20 µm, only moderately thick-walled; leaves usually tightly spirally twisted around stem when dry; capsules with a short neck broadly tapering to the seta (*l.*)..... **1. L. erectum**
- 2: Hairpoints of vegetative leaves usually short; margin narrowly revolute; leaf apex slightly toothed and somewhat asymmetrical; cells 9–12 µm, very thick-walled; leaves erect, scarcely twisted around stem when dry; capsules with a long neck gradually tapering to the seta **2. L. inclinans**

1. *Leptostomum erectum* R.Br., *Trans. Linn. Soc. London* 10: 320 (1811)

T: Hawkesbury and Grose Rivers, "Novae Hollandiae ora orientalis", [N.S.W.], *R.Brown*; holo: BM.

Gymnostomum leptostomum Hook., *Musci Exot.* 2: 169 (1820). T: *n.v.*

Leptostomum densum Thwaites & Mitt., *J. Linn. Soc., Bot.* 13: 305 (1873). T: Central Province, Ceylon [Sri Lanka], *G.H.K.Thwaites 123*; holo: H-BR.

Illustration: J.Hyvönen, *Ann. Bot. Fenn.* 24: 69, fig. 3a–c (1987).

Stems erect, 20–40 mm tall, simple, rarely branched. Leaves crowded, imbricate and tightly spirally twisted around the stem when dry, 1–2 mm long; hairpoint on vegetative and perichaetial leaves long, hyaline, smooth; margin broadly and strongly revolute. Laminal cells isodiametric, 10–16 (–20) μm , moderately thick-walled; lumina small; basal cells oblong-rectangular, moderately thick-walled.

Setae 12–25 mm long. Capsules ellipsoidal, 3–4 mm long; urn narrowed toward mouth; neck short, broadly tapering to the seta. Peristome reduced, inserted well below mouth, fragile and highly variable, consisting of a pale smooth low endostomial membrane with \pm irregular rudiments of segments at its apex; or with reduced exostome teeth, yellowish. Spores finely papillose, 18–25 μm diam. Chromosome number not known.

Occurs in eastern Qld and in eastern N.S.W., A.C.T. and rare in Vic.; grows on tree trunks (*Nothofagus*, *Araucaria*, *Eucalyptus* and *Casuarina*) and on granite rock faces at 500–1550 m. Also in Sri Lanka and New Zealand.

Qld: Peases Lookout, Eungella, *I.G.Stone 17307* (MEL). N.S.W.: upper Shoalhaven R. valley, *H.Streimann 899* (CANB, MEL); Jenolan Caves, *Blakely 630* (NSW). A.C.T.: Hanging Rock, Tidbinbilla Valley, *D.G.Cacheside 65.50* (AD). Vic.: Coast Ra., Bendoc, *I.G.Stone 721* (MEL).

A few early collections labelled "*L. densum*" have been located in Australian herbaria, and all represent *L. erectum*. Hyvönen (1987), recognised *L. densum* as a distinct species, but he did not list it for Australia. However, Crum (1992) placed it in the synonymy of *L. erectum* and considered the "smaller size of Australian populations the result of less optimal climatic conditions", while variation in the peristome conforms to the range in *L. erectum*.

Previous incorrect identifications have placed *L. erectum* in Tas., but only a few collections have been found to occur south of the N.S.W.–Vic. border. Other Australian specimens have been incorrectly identified as *L. inclinans*. The two species are quite distinct if capsules are present but, in their absence, *L. erectum* and *L. inclinans* can be distinguished as follows: strongly and broadly revolute leaf margins, a long smooth hairpoint, apex symmetrical and leaves spirally and often tightly wound around the stem in *L. erectum*; in *L. inclinans* the leaves have a narrowly revolute border, a shorter, smooth to faintly serrulate, asymmetrical hairpoint and leaves that are more erect and not tightly wound around the stem. *Leptostomum erectum* occurs at lower elevations, and it is more tropical in its distribution than *L. inclinans*.

There is evidence that new plants can regenerate after fire from damaged corky pads.

2. *Leptostomum inclinans* R.Br., *Trans. Linn. Soc. London* 10: 320 (1811)

Gymnostomum inclinans (R.Br.) Hook., *Musci Exot.* 2: pl. 168 (1819). T: Montis Tabularis [Mt Wellington], Insula Van Diemen [Tas.], *R.Brown*; iso: BM.

Leptostomum gracile R.Br., *Trans. Linn. Soc. London* 10: 321 (1811). T: "Dusky Bay" [Dusky Sound], South Island, New Zealand, 1791, *A.Menzies*; holo: BM; iso: E.

Leptostomum flexipile Müll.Hal., *Bot. Zeitung (Berlin)* 9: 547 (1851). T: New Zealand, *coll. unknown*; holo: NY *n.v.*

Leptostomum inclinans R.Br. var. *longiseta* Hampe, *Linnaea* 28: 207 (1856), *nom. nud.* (in synon.). Based on: Sealers Cove, Vic., *F.Mueller* (BM).

Illustrations: R.Brown, *op. cit.* pl. 23, fig. 2 (1811); V.F.Brotherus, *Nat. Pflanzenfam.*, 2nd edn, 10: 406, fig. 356 (1924), as *L. gracile*; J.Beever, K.W.Allison & J.Child, *Mosses of New Zealand*, 2nd edn 99, fig. 43a–e (1992).

Plants forming large tomentose corky pads to 30 cm wide and 8 cm high, of bright pale green shoots, bright brown below. Stems erect, branched, 2–3 (–6) cm high. Leaves moderately

crowded and erect when moist, closely appressed and sometimes slightly twisted around stem when dry, 1.5–2.0 (–3.0) mm long, ±oval; apex obtuse, asymmetrical and slightly serrulate; margin narrowly recurved except at the apex; costa in upper vegetative and perichaetial leaves excurrent as a short smooth to faintly denticulate unbranched hairpoint. Laminal cells isodiametric, 9–12 µm, very thick-walled, smooth.

Setae long-exserted, 2–5 cm long. Capsules erect to inclined, slender, 4–7 mm long, gradually narrowed to the seta through a long neck, when dry the neck narrowed and wrinkled. Peristome double; exostome teeth lacking or reduced to a very low membrane scarcely exceeding the mouth of the urn, sometimes differentiated into very short yellow tooth-fragments; endostome well developed, projecting 210–250 µm beyond the mouth as a densely papillose membrane with many short segments above. Spores 22–32 (–38) µm, bluntly and rather coarsely papillose. Chromosome number $n = 6, 12$, *vide* H.P.Ramsay, *Austral. J. Bot.* 22: 314 (1974).

Occurs in south-eastern Qld, eastern N.S.W., A.C.T., and common in Vic. and Tas.; epiphytic on trunks and branches of e.g. *Eucalyptus* and *Nothofagus* and in crevices of granitic rocks. Also in New Zealand, Campbell Island and Macquarie Island.

Qld: Beechmont Plateau, near Binna Burra, Lamington Natl Park, *D.G.Catcheside* 65.323 (AD). N.S.W.: Careys Peak, Barrington Tops Natl Park, Oct. 1992, *G.J. & D.W.Harden* (NSW). A.C.T.: Booth Ra., *H.Streimann* 35660 (CANB). Vic.: Major Mitchell Plateau, Grampians, *H.Streimann* 3112 (CANB). Tas.: L. Dobson road, 16 km WNW of Bushy Park, *H.Streimann* 39945 (CANB, HO).

Although matting of the stems usually forms a large corky pad, plants are sometimes sparse and not matted. This species is distinguished by the long setae and the many narrow, long-necked capsules that are either erect or, when inclined, appear to dangle. Sterile specimens can be distinguished by the erect leaves that are scarcely twisted around the stem, the leaves appearing broad and lax with narrowly revolute margins, and laminal cells that have small lumina and very thick walls.

3. *Leptostomum macrocarpon* (Hedw.) Bach.Pyl., *J. Bot. (Desvaux)*, sér. 2, 3: 15 (1814)

Bryum macrocarpon Hedw., *Sp. Musc. Frond.* 178 (1801). T: 'Otaheiti' [Tahiti, Society Is.]; lecto: BM *n.v.*, *vide* J.Hyvönen, *Ann. Bot. Fenn.* 24: 64 (1987).

Illustrations: J.Hyvönen, *Ann. Bot. Fenn.* 24: 65, fig. 1a–c (1987); J.Beever, K.W.Allison & J.Child, *Mosses of New Zealand*, 2nd edn 99, fig. 43f–h (1992); H.Streimann & N.Klazenga, *Cat. Austral. Mosses* [front cover] (2002).

Plants forming large green or yellow-green corky tufts 8–20 mm tall. Stems simple or branched, closely matted; more densely foliate in upper parts. Leaves erect, loosely or closely imbricate and ±twisted when dry, somewhat spirally wound around the stem, suberect when moist, ovate-oblong or obovate-oblong, 2.25–3.00 mm long; apex obtuse; margin entire, broadly to narrowly revolute; costa stout, in upper vegetative and perichaetial leaves excurrent in a long twisted-flexuose ciliate-branched hyaline hairpoint. Laminal cells subquadrate or broadly hexagonal, 20–30 µm long, smooth, thin-walled; cell contents conspicuously stellate-shrunken when dry; basal cells short-oblong.

Setae 10–15 (–45) mm long, pale yellow or orange, slender, flexuose. Capsules erect, ovate-oblong, 3.0–4.5 mm long; urn scarcely narrowed at base. Peristome reduced; exostome teeth scattered projections; endostome segments rudimentary, reduced to a low hyaline irregularly papillose roughened membrane. Spores 16–20 µm, finely papillose. Chromosome number not known.

A tropical to subtropical species in south-eastern Qld and N.S.W. as far south as Kiama and Fitzroy Falls; also in Lord Howe Island, Norfolk Island, New Zealand and in Polynesia as far east as the Society Islands.

Qld: Mt Merino, Macpherson Ra., *H.Streimann* 350 (CANB, MEL). N.S.W.: Mt Warning, *H.Streimann* 283 (CANB, MEL); Lilyvale, Sept. 1891, *coll. unknown* (NSW).

This is a striking moss with the plants matted to form large corky clumps on tree trunks, and covered with numerous long-exserted capsules. *Leptostomum macrocarpon* is readily distinguished from other species by the broader leaves with long, twisted-flexuose, ciliate-

branched hairpoints on the upper vegetative and perichaetial leaves. The leaves are imbricate-curved and somewhat twisted around the stem when dry with the margins strongly and broadly revolute. The very thin-walled laminal cells with contents that are conspicuously shrunken, central and somewhat stellate in appearance in the dried condition are also distinctive, as is the comparatively broad, short capsule with a narrow mouth. The distributions of *L. erectum* and *L. macrocarpon* overlap.

Excluded Name

Leptostomum depile Müll.Hal., *Genera Musc. Frond.* 147 (1901)

T: Vic., *F.M.Campbell 511*; holo: BM.

This is a probably a species of *Bryum s. lat.* (Hyvönen, 1987).