

POLYTRICHACEAE

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Polytrichaceae Schwägr., in C.L. von Willdenow, *Sp. Pl.* 5(2): 1 (1830).

Type: *Polytrichum* Hedw.

Dioicous or monoicous. Stems erect, rigid, simple or branched, with a polytrichoid (solid hydrome cylinder) or dawsonioid (hydroids and sclerenchyma) central strand. Rhizoids hyaline. Lower leaves small, often scale-like, appressed, remote; upper leaves larger, often crowded, with a broad pale unistratose sheathing base and a narrow lamina that is often bi- to multistratose almost to the margin. Lamina with isodiametric ±smooth abaxial cells; cuticle sometimes longitudinally striate; margin mostly entire to distinctly serrate, sometimes with specialised elongated marginal cells; sheath cells mostly rectangular to linear, narrower towards margin; costa single, prominent, percurrent to slightly excurrent, usually broad and ill-defined in lamina; lamellae on adaxial side of costa and lamina.

Perichaetium terminal; perichaetial leaves scarcely differentiated, usually with a longer sheathing base. Perigonium rosulate, generally producing an annual innovation from the centre, with uni- to multiseriate paraphyses among antheridia; perigonal leaves with a wide-sheathing base and a rudimentary lamina. Calyptra small or large, mitrate or cucullate, rarely glabrous or apically serrate, often densely hairy. Setae terminal or pseudolateral by subperichaetial innovation, elongate, mostly single, smooth. Capsules erect, becoming slightly inclined to horizontal, symmetrical or asymmetrical, terete and cylindrical or angled; neck short and weakly differentiated or hemispherical, sometimes abruptly constricted from the urn as a hypophysis; stomata lacking or only on basal part of capsule; annulus absent or a single row of cells; operculum acute or rostellate. Peristome single; teeth 16–64, short, lingulate or triangular, curved inwards, attached at or near the rounded tips to a discoid expansion of the columella apex (epiphragm; lacking in *Dawsonia*), with a low or high basal membrane; in *Dawsonia* elongated with a bristle-like upper part. Peristome teeth consisting of whole elongated cells following the tooth shape in several concurrent rows, mostly pale except for a coloured midline. Spores globose, isomorphic, echinate, granulose or smooth (in *Dawsonia*).

The Polytrichaceae comprises 19 genera and c. 150–200 species. The family is widely distributed throughout the world, and diversity is highest in SE Asia and South America. Represented in Australia (except for W.A. and N.T.) by seven genera and 14 species; two species are endemic. Plants grow in tufts, scattered or gregarious, on soil, humus or peat, rarely on rock. The family is an important component of the pioneer plant communities of disturbed soil, and many of the species are light-tolerant and xerophytic. Chromosome numbers are based on $x = 7$, with most Australian representatives having $n = 7$ chromosomes. Polyploidy to $n = 14$ is known in one taxon in Australia, *vide* H.P.Ramsay, *J. Hattori Bot. Lab.* 82: 213–226 (1997).

The genus *Dawsonia* was formerly segregated in the monotypic Dawsoniaceae, but it was transferred to the Polytrichaceae by Smith (1971). Some authors (Zanten, 1973; Beever *et al.*, 1992; Streimann & Klazenga, 2002) agree with this move, while others (Scott & Stone, 1976; Catchside, 1980; Walther, 1983; Jarman & Fuhrer, 1995; Ramsay, 1997) maintain the Dawsoniaceae as a separate family.

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Key to Species

This key is based on gametophytic characters to facilitate the identification of all specimens: sporophyte attributes, although they are characteristic for genera, are ignored in this context. Consequently, a key is provided only for species because gametophyte characters are usually not diagnostic for individual genera.

Atrichum can be distinguished from other genera by lacking or having only sparse lamellae on the adaxial side of the narrow costa and by its narrow, slightly curved capsules with long, membranous calyptrae; *Notholigotrichum* by the triangular shape of the peristome teeth; *Pogonatum* by the deep reddish brown pigmentation of the peristome; *Polytrichastrum* by the cylindrical, terete to faintly plicate capsules with stomata on the basal hypophysis; *Polytrichum* by its leaves having a sheathing base and a narrow, lanceolate limb and box-like capsules with four distinct angles; *Polytrichadelphus* by the calyptra which is glabrous except for a few terminal erect bristles, the long-beaked operculum, and the asymmetrical, concave-convex capsule that is almost crescent-shaped in transverse section; and *Dawsonia* by its concave-convex capsules and bristle-like peristome.

- 1 Adaxial lamellae absent or fewer than 5, restricted to the costa **Atrichum androgynum**
- 1: Adaxial lamellae numerous, more than 25, covering almost the entire lamina 2
 - 2 Apical cells of adaxial lamellae with distinct papillae (1:) 3
 - 2: Apical cells of adaxial lamellae ±smooth or very slightly papillose to granulose 4
- 3 Plants small; stems less than 2 cm tall; leaves short, with a triangular lamina and entire or slightly denticulate margins (2) **Notholigotrichum australe**
- 3: Plants rather large; stems often more than 2 cm tall; leaves rather long, with a linear-lanceolate lamina and distinctly serrate margins **Polytrichastrum alpinum**
 - 4 Margin of lamina widened, partly covering the adaxial lamellae (2:) **Polytrichum juniperinum**
 - 4: Margin of lamina upcurved or flat, never covering the adaxial lamellae 5
- 5 Apical cells of at least the central adaxial lamellae retuse (cross-section) (4:) 6
- 5: Apical cells of the adaxial lamellae rounded or bottle-shaped 7

- 6 Lamellae distinctly crenate by the upper margin (side view); leaf margin serrate with multicellular teeth; lamina erect-spreading to slightly squarrose when moist (5) **Pogonatum neesii**
- 6: Lamellae straight or only slightly crenate by the upper margin (side view); leaf margin serrate with unicellular teeth; lamina distinctly squarrose when moist **Polytrichum commune**
- 7 Lamellae very irregularly crenate by the upper margin (side view) (5:) **Pogonatum tubulosum**
- 7: Lamellae regularly crenate or straight 8
- 8 Apical cells of adaxial lamellae with a distinctly thickened outer wall (7:) 9
- 8: Apical cells of adaxial lamellae with an outer wall as thin as other walls or only slightly thicker 10
- 9 Adaxial lamellae 4–5 (–6) cells high; dorsal laminal cells short-rectangular (1.4–2.5: 1) (8) **Dawsonia longiseta**
- 9: Adaxial lamellae 5–9 cells high; dorsal laminal cells (sub)quadrate **Polytrichadelphus magellanicus**
- 10 Stems with a dawsonioid central strand (hydroids and sclerenchyma) (8:) **Dawsonia superba** var. **pulchra**
- 10: Stems with a polytrichoid central strand (solid hydrome cylinder) 11
- 11 Adaxial lamellae ±straight to evenly rounded-crenate by the upper margin (side view) (10:) 12
- 11: Adaxial lamellae unevenly (obliquely) crenate by the upper margin (side view) 13
- 12 Unistratose leaf margin 5–13 cells wide, entire or only slightly denticulate apically; adaxial lamellae crenate by the upper margin (side view), with sparsely papillose apical cells (11) **Notoligotrichum crispulum**
- 12: Unistratose leaf margin 2–6 cells wide, regularly serrate; adaxial lamellae indistinctly crenate or straight by the upper margin (side view), with smooth apical cells **Pogonatum subulatum**
- 13 Unistratose leaf margin 1 or 2 cells wide; leaves crowded, to 15 mm long (11:) **Dawsonia polytrichoides**
- 13: Unistratose leaf margin 3–10 cells wide; leaves rather remote, to 12 mm long **Polytrichastrum formosum**