

SEMATOPHYLLACEAE

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Sematophyllaceae Broth., *Nat. Pflanzenfam.* I, 3: 1098 (1908)

Type: *Sematophyllum* Mitt.

Autoicous, dioicous or polyoicous. Plants pleurocarpous, creeping, slender to robust, forming dense dull or glossy green to yellowish green flat mats. Stems red; central strand lacking; branches crowded, irregularly to subpinnately or pinnately divided, complanate to erect or ascending. Pseudoparaphyllia usually foliose. Stem and branch leaves similar, appressed, erect or spreading, occasionally secund, sometimes falcate when dry, rarely falcate-secund, ovate-lanceolate, acute to long-acuminate, entire to serrate or denticulate in the upper margin, ecostate. Laminal cells rhomboidal to linear or elongate-fusiform, smooth or papillose; alar region well developed, with a distinct basal row of coloured or hyaline inflated cells.

Perigonia on stems or the bases of branches. Perichaetia on main stems; inner perichaetial leaves frequently long-acuminate. Calyptra smooth, cucullate. Seta long-exserted, smooth or, occasionally, rough, reddish. Capsule small, horizontal to inclined, ovoid to elongate; exothecial cells collenchymatous or subcollenchymatous; operculum conical, short- to long-rostrate; annulus usually lacking. Peristome diplolepidous, double-alternate, rarely single (*Meiothecium*); exostome teeth 16, lanceolate-subulate, cross-striate dorsally, papillose; lamellae well developed; teeth incurved between segments when dry; endostome segments 16, arising from a medium to high basal membrane, ±the same length as the teeth, keeled; cilia 1 or 2, slender, occasionally rudimentary. Spores small to medium.

The Sematophyllaceae *s. lat.* includes 53 genera (Goffinet & Buck, 2011) and at least 600 species. Although it is found in temperate regions, the family is most diverse in the tropics and subtropics. The family is considered to be comparatively young and still evolving (O'Shea, 1999) with considerable gametophytic plasticity that can greatly complicate identification. In recent revisions of moss classification based on molecular DNA data, Goffinet & Buck (2004), Goffinet *et al.* (2008) split the Sematophyllaceae into two — the newly described Pylaisiadelphaceae (15 genera) and the Sematophyllaceae *s. str.* (38 genera). Most recently, Goffinet *et al.* (2011) have listed 16 genera (including *Isopterygium*) in the Pylaisiadelphaceae and 28 in the Sematophyllaceae. These circumscriptions are followed here, but with some reservations.

Although a few genera (e.g. *Sematophyllum* and *Warburgiella*) extend into temperate latitudes, most Sematophyllaceae are found in tropical and subtropical forests where they are epiphytic on stems and branches, occasionally occurring as epiphylls, also on fallen logs and, more rarely, on rock or on the damp forest floor.

The family is characterised by ecostate leaves with linear or rhomboidal cells that are either smooth or papillose and an alar region that is well differentiated, often seriate, inflated and vesiculose. The capsule is borne on a long-exserted seta that is smooth or, occasionally, rough, and it is horizontal to inclined due to a bending of the upper part of the seta (Buck & Vitt, 1986). The operculum is conical and short- or long-rostrate. Exothecial cells are typically collenchymatous (thickened at the corners), occasionally subcollenchymatous (with thickenings on lateral walls and not confined to corners). The peristome is typically hypnoid, i.e. diplolepidous with alternating segments of the *Bryum* type. The expected overall peristomial pattern of OPL:PPL:IPL is 4:2:4–8 (Shaw & Robinson, 1984).

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Peristomial characters, such as the endostome being absent or reduced in *Meiothecium* or being longer than the exostome in *Macrohymenium*, have been used to separate genera. See Ramsay *et al.* (2002a, b, 2004) for SEMs of peristomes. Other generic distinctions are based on differences in leaf cell papilosity, e.g. seriatly papillose with simple papillae in *Radulina* or unipapillose in *Trichosteleum*, while in others (e.g. *Acroporium*) a range of papilosity can exist even within a single species. Furthermore, the extent of alar development frequently distinguishes particular genera, e.g. *Sematophyllum*, *Acroporium* and *Meiothecium*.

Australian Sematophyllaceae *s. str.* currently includes 11 genera, 25 species and two additional infraspecific taxa.

In the generic treatments provided here, global species numbers are based on information from *Tropicos* (accessed July 2011) and *Encyclopedia of Life* (accessed July 2011).

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KEY TO GENERA

- 1 Laminar cells seriatly papillose over the lumina..... **RADULINA**
- 1: Laminar cells smooth, prurlose or unipapillose2
- 2 Peristome single, persistent or fragile and lost at maturity3
- 2: Peristome double, persistent4
- 3 Peristome persistent; laminar cells smooth; inner perichaetial leaves entire **MEIOTHECIUM**
- 3: Peristome fragile, often absent in mature capsules; laminar cells unipapillose; inner perichaetial leaves serrate to serrulate **MEIOTHECIELLA**
- 4 Endostome segments erect when dry, 4–5 times longer than exostome teeth ... **MACROHYMENIUM**
- 4: Endostome segments incurved when dry; not more than twice as long as exostome teeth5
- 5 Leaves strongly flexuose, falcate or falcate-secund when dry; laminar cells elongate-linear in the upper third of the leaf6
- 5: Leaves appressed to erect-spreading, at most slightly flexuose, not falcate-secund when dry; laminar cells in the upper third of the leaf rhomboidal or short-oblon.....7
- 6 Leaves abruptly acuminate-setaceous; upper leaf margins strongly serrate; alar cells enlarged, moderately thick-walled; exothecial cells semicollenchymatous, their longitudinal walls thickened..... **WARBURGIELLA**
- 6: Leaves gradually acuminate; upper leaf margins entire or distantly serrulate; alar cells greatly enlarged, thin-walled; exothecial cells strongly collenchymatous **RHAPHIDORRHYNCHIUM**
- 7 Laminar cells smooth, or with upper cells prurlose, rarely unipapillose8
- 7: Laminar cells unipapillose9
- 8 Leaves tubulose or strongly concave; laminar cells smooth or with a single papilla on upper cells; cell walls incrassate, pitted; alar region with outer basal alar cells curved inward, much larger than other alar cells **ACROPORIUM**
- 8: Leaves never tubulose, only slightly to moderately concave; laminar cells smooth, lacking papillae, thin to thick-walled, but never incrassate or pitted; alar region with straight (not curved) outer alar cells only slightly larger than other alars **SEMATOPHYLLUM**
- 9 Laminar cells unipapillose in both vegetative and perichaetial leaves; alar cells inflated and thin-walled **TRICHOSTELEUM**
- 9: Laminar cells unipapillose in vegetative leaves only; alar cells inflated and thick-walled..... 10
- 10 Leaves ovate-lanceolate, acuminate; operculum short-conical **ACANTHORRHYNCHIUM**
- 10: Leaves ovate, acute; operculum long-rostrate..... **PAPILLIDIOPSIS**