SEMATOPHYLLUM

Helen P. Ramsay

Sematophyllum Mitt., J. Linn. Soc., Bot. 8: 5 (1864); from the Greek *sema* (a mark, flag or sign) and *phyllon* (a leaf), in reference to the distinct alar region of the leaves.

Type: *S. demissum* (A. Wilson) Mitt.

Dioicous or, rarely, autoicous. Plants slender to coarse, forming dense dull or ±glossy green to yellowish green mats. Main stems creeping, red; branches erect-ascending crowded, irregularly subpinnately to pinnately divided. Stem and branch leaves similar, appressed, erect or spreading, occasionally secund, never falcate when dry, ±concave, ovate-lanceolate or oblong, never tubulose, blunt, ecostate, short or broadly pointed, acute or acuminate, entire or faintly denticate on the upper margin. Laminal cells in the distal third (including the acumen) rhomboidal, oval-oblong, fusiform [L:W < 7:1], smooth; alar region well developed, with a distinct basal row of straight slightly elongate inflated cells, their walls hyaline or pigmented; supra-alar cells several, quadrate.

Perichaetia on main stems; inner perichaetial leaves with short to subulate-pointed apices. Calyptra smooth, cuculate. Seta long, red, occasionally yellow-orange or purple, smooth. Capsule small, ±erect to horizontal, ovoid to elongate; exothecial cells collenchymatous; operculum slenderly rostrate from a swollen base. Peristome diplolepidous, double, alternate; exostome teeth 16, lanceolate-subulate, cross-striate dorsally; lamellae well developed; teeth incurved between the segments when dry; endostome of 16 segments from a low or high basal membrane, the same length as the teeth, keeled; cilia 1 or 2, slender, occasionally rudimentary or absent. Spores small to medium-sized.

This widely distributed genus of c. 200 species occurs in temperate to tropical regions; five species and an additional variety are known from Australia. Although substrata include tree trunks, branches and fallen logs, *Sematophyllum* is less common on rock.

A cladistic analysis of the Sematophyllaceae by Hedenäs & Buck (1999) emphasised the need for a thorough revision of the genus *Sematophyllum* itself. Based on the six species studied, only two of which occur in Australia, the genus was found not to be monophyletic: “It may well be that *Sematophyllum* needs to be divided into several genera” (Hedenäs & Buck, 1999). The authors also suggested that at least one new genus, centred around the South American species *S. subsimplex* (Hedw.) Mitt. would be required. This genus, having affinities with their subfamily Wijkioideae (now in Pylaisiadelphaceae) rather than the subfamily Sematophylloideae, has yet to be described.

References


1 cl- National Herbarium of New South Wales, Mrs Macquaries Road, Sydney, New South Wales 2000.

Key

1. Leaves erect-spreading; alar region with cells numerous, in several rows, pigmented, quadrate, and irregularly thick-walled ................................................................. 1. S. homomallum

1: Leaves subsecund or secund, falcate or not; alar region with a single basal row of a few larger rectangular or oval cells, thin or thick-walled .................................................. 2

2. Plants epiphytic on bark; leaves ovate or linear-lanceolate, to 1.5 mm long, secund, not falcate; apices acute or acuminata................................................................. 3

3: Plants subaquatic on wet rock faces in or near streams or on damp soil; leaves ovate-lanceolate, 1.5–2.0 mm long, subsecund and falcate, with acuminate apices ........................................ 4

4: Leaves ovate; apices acute; apical cells short .................................................................. 4. S. subpinnatum

3: Leaves linear-lanceolate; acuminata to long-acuminata; apical cells longer ....... 3. S. subhumile

4. Plants glossy, bright pale-green or yellowish green; leaves to 1.5 mm long; apices broadly acute to short-acuminata; seta papillose above, smooth below............................... 2. S. jolliffii

4. Plants not glossy, golden-brown; leaves 1.5–2.0 mm long; acuminata; seta uniformly smooth ................................................................. 5. S. uncinatum


Hypnum keyssii Kiaer ex F.M.Bailey, Syn. Queensland Fl., Suppl. 1: 69 (1886), nom. nud. Based on: Mt Perry, Qld. J.Key [90] (MEL 34605, 1002402, 1002343).


Sematophyllum homomallum

Dioicus. Plants dull bronze-green, forming dense very glossy mats; branches erect, small to robust. Stems to 3 cm long, creeping, radiculose, irregularly pinnate with somewhat cupululate branches. Leaves ovate-lanceolate to oblong, short and bluntly acuminata, markedly secund, erect, 1.25–1.75 mm long, c. 0.5 mm wide, concave; margins entire, plane and slightly recurved. Laminal cells somewhat thickened, frequently porose, with a narrowly elongate or elliptic lumen, 40–60 × 4–7 µm, transparent; alar region with 3 or 4 rows of orange or yellow irregularly quadrate thick-walled cells; supra-alar cells quadrate.

Perigonia genniform in leaf axils on the upper side of the stem. Perichaetal leaves erect, lanceolate, entire. Seta translucent, smooth, 5–8 mm long, yellowish orange and twisted to the left. Capsule erect, cylindrical, ovate or oblong, 1.20–1.75 mm long, with a short tapered neck; exothelial cells with thickening more pronounced on the longitudinal walls giving the capsule a striped appearance. Peristome with the exostome teeth having long-attenuate papillose apices; trabeoulacae well developed; endostome with a low papillose basal membrane; cilia 1 or 2; operculum finely rostrate. Spores green, 24–27 µm diam. Chromosome number not known.

Ocurs in W.A., S.A., Qld (rare), N.S.W., Vic. and Tas.; most common in temperate south-eastern Australia. Usually found on dry exposed rocks, often in coastal habitats, occasionally corticolous on tree bases and branches, much rarer in wet habitats. Also in Sri Lanka, Malesia, Oceania and New Zealand.

W.A.: Mt Frankland, S.W.Jackson s.n. (NSW, PERTH); Cape Le Grand, N.N.Donner AD-C15495 (AD); Margaret River, A.C.Beagleyholme 14371 (MEL). S.A.: Mt Monster, 10 km S of Keith, R.D.Seppl 3500 (HO); Marrano Cl, J.R.Spence 4307 (NSW); Koppio, Eyre Penn., L.D.Williams 6666 (AD). Qld: Dunk Is., D.G.Catcheside 76.98 (AD); Binna Burra, Lamington Natl Park, D.G.Catcheside 65.308 (AD). N.S.W.:
Thallus morphology is variable, and while plants are often rather small in exposed situations, they can be much larger in more sheltered habitats. Fertile individuals are comparatively rare in eastern Australia, being far more common in South Australia, where this is the most common Sematophyllum species.

The glossy bronze colour of S. homomallum is often pronounced, and this species is generally larger and coarser than either S. subhamile or S. subpinnatum. The 3 or 4 rows of irregularly thick-walled and almost quadrate alar cells are particularly distinctive. Specimens of S. homomallum resemble a larger version of the tropical S. subpinnatum in almost all gametophytic characters, except for the thick-walled alar cells and overall colour. The longitudinal thickening on the exothecial cells gives the capsule wall a striped appearance similar to Warburgiella leucocytus, but the latter has strongly falcate-secund leaves with a long acumen and lacks the diagnostic alar region of S. homomallum.


 Dioicus. Plants robust, bright pale green to yellowish green, glossy, with a metallic lustre, forming dense flat mats. Stems to 16 cm long or longer. Branches 5–8 cm long, complanate and markedly cuspidate towards the tips. Leaves 1.50–1.75 mm long, c. 0.75 mm wide, loosely or closely imbricate, erecto-patent or spreading, secund, concave, ecostate; apex broadly acute to short-acuminate; margins plane or broadly inflexed on one side in the lower part, entire or slightly denticulate. Laminal cells smooth: apical cells short, midleaf and lower cells oblong-linear to narrowly elliptic; alar region well developed, with a basal row of 2 or 3 large inflated thin-walled cells.

Inner perichaetial leaves with a broad acute apex. Seta short, 10–15 mm long, slightly papillose above, smooth below. Capsule c. 1 mm long, ovoid, constricted below the mouth; operculum with an oblique rostrum. Peristome with exostome teeth narrowly lanceolate, becoming gradually attenuated to a blunt apex, papillose; endostome of narrow subulate segments; cilia not seen. Spores 16–20 µm diam. Chromosome number not known.

Uncommon in temperate south-eastern Australia (N.S.W., Vic. and Tas.), where it occurs on wet ground and emergent rocks in streams, occasionally submerged. Also in New Zealand.

N.S.W.: Budawang Ra., 25 km W of Milton, H.Streissmann 1307 (CANB, HO); Fitzroy Falls, W.B.Schofield 79062, 79268 & M.I.Schofield, Grand Canyon Walk, Blackheath, W.B.Schofield 81028, M.I.Schofield, H.P.Ramsay & P.M.Selkirk (NSW); Vic.: Mount Rosea Ck, Grampians, A.C.Beanglaheole 30375B (MEL); Upper Yarra Falls, A.W.Thies FN1577P (MEL). Tas.: Milhouse Falls, W.A.Weymouth 164 (HO); Liffy Falls, H.P.Ramsay R1824 (NSW).

Comparatively short and broad leaf apices distinguish non-fruiting plants of S. jolliffii from other Australian species, except S. homomallum and S. subpinnatum. However, these two species are terrestrial or epiphytic, and not associated with rocks in and near streams. Furthermore, S. homomallum has numerous, small, pigmented, thick-walled alar cells.

Sematophyllum jolliffii resembles S. uncinatum in general morphology, but it is usually bright pale green or yellowish green and glossy, even lustrous. Branch tips of S. jolliffii are short and cuspidate, whereas those of S. uncinatum are long and slender. Although both species occupy wet habitats, S. uncinatum grows on wet rock faces and stones, but is not truly aquatic.


Diocious. Plants pale yellow-green, densely caespitose; stems creeping, 1–2 cm long; branches 3–4 mm long. Leaves linear-lanceolate, gradually short- to long-acuminate, concave, 1.0–1.5 mm long, c. 0.5 mm wide; margins plane to narrowly reflexed, strongly secund at apices of stems and branches. Laminal cells narrowly linear, 40–70 × 4–7 µm [L:W 7–10:1]; alar region with a basal row of subquadrate or oblong and slightly to moderately inflated cells; supra-alar cells small, occasionally ascending margin. Gemmae occasionally on leaf margins of both varieties.

Perichaetial leaves erect, lanceolate, acuminate. Seta smooth, to 10 mm long, red. Capsule erect, to 1 mm long, obovate, expanded at the apex and exposing the peristome. Exostome teeth lanceolate, narrowing to a hyaline apex, papillose, short-trabeculate; endostome segments folded along the midline, subulate, faintly papillose, with a moderately high basal membrane; cilia 1 or 2. Spores 10–16 µm diam. n = 11, *fide* Ramsay et al. *op. cit.* 7, fig. 3e (2002).

The smaller size, yellowish green colour and narrower acuminate leaves, often secund at branch apices distinguish this moss from other Australia *Sematophyllum* species. The type specimen of *S. aciculum* is essentially a stunted xerophytic form of *S. subhumile* from exposed and comparatively dry tree trunks. Indeed, Australian populations of *S. subhumile*, apart from the more xerophytic *aciculum* morph, are often larger than tropical Asian specimens, while their stem apices are more pointed and the leaves have more acuminate apices.

Two varieties are recognised.

Inner perichaetial leaves with entire margins ................................................. var. *subhumile*

Inner perichaetial leaves with serrulate margins ........................................ var. *contiguum*

3a. *Sematophyllum subhumile* (Müll.Hal.) M.Fleisch. var. *subhumile*

The type variety tends to have leaves with acute to short-acuminate apices, and an alar region of numerous, subquadrate, but scarcely inflated cells. These characters are variable, so the most reliable diagnostic character is the entire (as opposed to serrulate) upper margins of the perichaetal leaves.

Most common in temperate latitudes of Australia (southern W.A., N.S.W., A.C.T., Vic. and Tas.), but it also extends into Qld and subtropical Lord Howe Island and Norfolk Island. Mainly on tree barks, logs and rock in rainforest and fern gullies. Also in temperate and tropical Asia, southern Africa, Pacific islands and New Zealand.

W.A.: Gingarup, Feb. 1911, J.Sayer (NSW). Qld: Browns Ck, Cape Weymouth, H.Streimann 56445, 56450 (CANB); Daintree R., 1882, T.Penttzke (NY); Mount Spec Nail Park, B.C.Tan 94-677A et al. (FH, NSW), N.S.W.: near Adelina Falls, Blue Mins, B.C.Tan 94-816 et al. (FH); Fitzroy Falls, Mittagong, B.C.Tan 94-873, 94-880 (FH, NSW); Whian Whian S.F., W.B.Schofield 80734 (NSW). A.C.T.: Tidbinbilla, D.G.Catcheside


The type specimens of *S. contiguum* differ from *S. subhumile* in having more acuminate leaf apices, in addition to serrulate perichaetial leaf margins, and fewer, oblong, inflated alar cells. Given the considerable variability exhibited by *S. subhumile*, Ramsay et al. (2002) interpreted these differences worthy of only varietal recognition.

Uncommon but widespread in eastern Australia (Qld, N.S.W., A.C.T., Vic. and Tas.), and in W.A.; also in South America, Oceania and New Zealand.

W.A.: Beedelup Falls, A.C.Beauglehole 14511, 14489 (MEL).  Qld: Cammoo Caves, W.B.Schofield 904534 & M.I.Schofield (MEL); Bunya Mountains Natl Park, W.B.Schofield 90640, 90643 (NSW); Binna Burra, I.G.Stone 12786 (MEL); Dunk Is., D.G.Catcheside (AD).  N.S.W.: near Banjo Ck, Doyles River S.F., H.D.Viti 27562 (NSW); Wentworth Falls, Blue Mtns, M.Fuller 96 (CANB); Majors Ck, L.G.Adam 1961 (BM, BRI, CANB, MEL, NSW).  A.C.T.: Lees Ck Gully, N.T.Burbridge 6996, 7000 (CANB); Bushrangers Ck, L.A.Craven 1955 (CANB).  Vic.: Otway Ra., A.C.Beauglehole 74280 (MEL).  Tas.: Kangaroo Pt, W.A.Weymouth 734 (HO).

Specimens at MEL and NSW, originally named *S. crassiusculum* (Brid.) Broth. (H.P.Ramsay, *Telopea* 2: 497, 1984), represent *S. subhumile* var. contiguum.


Autoicous. Plants small to medium-sized, sparingly branched, forming rather dull green or yellowish green mats. Stems to 4 cm long, ascending to erect, narrowly complanate; branches short, blunt, ascending, the apices curved, appearing paler above and darker below. Leaves crowded, erect, lax, imbricate when dry, oval, 1.33–2.00 mm long, 0.65–0.76 mm wide, somewhat concave; apices obtuse to acute; margins entire, plane to narrowly reflexed at the base. Upper laminar cells oblong-linear to elliptic, thick-walled at the apex, 7–10 × 2–3 µm; midleaf and lower laminar cells narrowly elongate. 30–40 × 5–6 µm; alar area with a row of 3–6 small yellow vesicular cells on either side of the leaf base; supraular cells quadrate, smaller, biseriate.

Perichaetial leaves erect, comparatively narrow, ecostate, entire. Seta to 10–15 mm long, purple. Capsule suberect to inclined, oblong-cylindrical, symmetrical, scarcely arcuate, c. 1.3 mm mm long and 0.7 mm wide, constricted below the mouth; operculum conical, rostrate. Peristome with incurved lanceolate exostome teeth; endostome segments yellow, densely
papillose, not perforated; cilia absent or single. Spores 23–35 µm diam., papillose. \( n = 10 \), \textit{fide} H.P. Ramsay, W.B. Schofield & B.C. Tan, \textit{J. Hattori Bot. Lab.} 90: 7, fig. 3b (2002).

Occurs in northern W.A., N.T. and eastern Qld, and in eastern N.S.W. and Vic. Also in North and South America, India, East Asia, Malesia and the Pacific islands.

W.A.: Barker River, D.J. Edinger 493 (PERTH). N.T.: 6.5 km SE of Jim Jim Falls, Kakadu Natl Park, L.A. Craven 5809 (CANB); Edith Falls, Katherine Gorge Natl Park, L.A. Craven 6765 (CANB). Qld: Mt Lewis, B.O. van Zanten 68132 (GRO, NSW); Frenchmans Ck, W.W. Watts Q399 (NSW); Mount Hypipamee Crater Natl Park, near Atherton, B.C. Tan 94-516 (FH, NSW); Blue Waters Ck, 39 km S of Ingham, I.G. Stone 28368 (MEL).


\textit{Sematophyllum subpinnatum} is characterised by the curved branch apices that are paler above and darker below, the dullness of the plants, obtuse to acuminate and have more elongate apical cells.


 Dioicus. Plants robust, growing in dense soft glistening golden to yellow-brown mats. Stems long, to 8 cm, prostrate, irregularly and unequally subpinnately branched; branches usually 2–3 cm long, narrowly spreading, flexuose, mostly falcate and slightly hooked at the tips. Leaves ovate-lanceolate, 1.5–2.0 mm long, 0.4–0.6 mm wide, crowded, subsecund, falcate from a constricted base, tapering to a broadly acuminate apex, markedly concave; margins plane, narrowly recurved at the extreme base, entire or slightly denticulate above. Laminal cells narrowly linear-rohomboidal, with blunt ends, slightly verticillar, smooth or with slightly projecting ends, 40–80 × 4–5 µm; apical cells short and narrowly rhomboidal; cells towards the base short and somewhat rectangular, with thicker walls; alar region with a basal row hyaline or yellowish inflated and narrow cells, with narrow yellow cells across the insertion.

Perichaeta on stems or branches; perichaetal leaves numerous, lanceolate, short-pointed, entire or faintly denticulate, wide-spreading. Seta 15–20 mm long, red, slender, smooth, slightly twisted to the left. Capsule c. 1.5 mm long, horizontal to pendulous, ovoid; annulus lacking. Peristome with lanceolate caesome teeth, gradually narrowed, with a grooved median line, densely transversely striolate; dorsal trabeculae projecting laterally; ventral trabecula projecting radially in the upper part of tooth; endostome segments with the basal membrane c. half the height of segments; cilia 1 or 2, shorter than segments. Spores 14–20 µm diam., smooth. Chromosome number not known.

Occurs in southern temperate Australia (W.A., N.S.W., Vic. and Tas.) where it grows on wet rock faces in or beside streams. Also in southern Australia and New Zealand.
Sematophyllum uncinatum is a highly distinctive, robust, golden brown moss growing on wet rocks. The vegetative leaves taper to broadly acuminate apices, and the perichaetial leaves are short-pointed and subentire.

Streimann & Klazenga (Cat. Australian Mosses 156, 2002) noted that while Stone & Scott (Mosses of Southern Australia 604, 1973) included this species in Sematophyllum, the latter authors felt that it should be part of Rhaphidorrhynchium were that genus to be accepted. However, Ramsay et al. (2002) retained it in Sematophyllum because while the subsecund leaves and the frequently long leaf acumen resemble those of Rhaphidorrhynchium, the latter has flexuose or strongly falcate-secund leaves, as well as narrower leaves and leaf apices. There are also cellular differences, Rhaphidorrhynchium having shorter laminal cells while those of Sematophyllum are longer and narrower. Finally, the exothecial cells of Rhaphidorrhynchium are strongly collenchymatous, unlike those of Sematophyllum which are subcollenchymatous.

Small, immature plants of S. uncinatum can resemble Warburgiella leucocytus. However, the latter is never hygrophilous, and it has papillose setae and sharply denticulate perichaetial leaf acumens.

**Excluded Names**

Bartram (Farlowia 4: 244, 1952) reported S. saproxylophilum (Müll.Hal.) M.Fleisch. from North Queensland, having seen specimens at FH collected by L.J.Brass. However, these and other specimens named as S. saproxylophilum (e.g. at CANB), represent other species, hence Ramsay et al. (2002) excluded this moss from the Australian bryoflora.

Rhaphidostegium pseudohomomallum Müll.Hal., was reported from Australia by W.Forsyth (Proc. Linn. Soc. New South Wales 24: 683, 1900). However, specimens at NSW with this name, including those listed in Forsyth, are either S. subhumile or S. subpinatum.