

ORTHODONTIACEAE

A. Jonathan Shaw¹

Orthodontiaceae (Broth.) Goffinet, in W.R.Buck & B.Goffinet, *Bryophyte Biology* 104 (2000).

Bryaceae subfam. Orthodontioideae Broth., *Nat. Pflanzenfam.*, 2nd edn, 11: 347 (1925).

Type: *Orthodontium* Schwägr.

Autoicous, synoicous, heteroicous or paroicous. Rhizoids smooth, reddish. Leaves linear-lanceolate, flexuose, unbordered; costa narrow; laminal cells \pm linear except near base. Setae slender flexuose. Capsules erect or inclined, ovoid to cylindrical with a tapering neck. Peristome double; segments narrow, finely papillose or smooth.

Goffinet raised the subfamily of Brotherus (1925) to familial status (Buck & Goffinet, 2000) based on molecular and morphological studies. The family is cosmopolitan and comprises two genera, *Orthodontium* and *Orthodontiopsis*. Only *Orthodontium*, with two species, occurs in Australia.

References

Brotherus, V.F. (1925), *Nat. Pflanzenfam.*, 2nd edn, 11: 347.

Buck, W.R. & Goffinet, B. (2000), Morphology and classification of mosses, in A.J.Shaw & B.Goffinet (eds), *Bryophyte Biology*, 71–123. Cambridge University Press, Cambridge.

ORTHODONTIUM

Orthodontium Schwägr., *Sp. Musc. Frond.*, Suppl. 2, 2: 123 (1827); from the Greek *ortho-* (erect) and *odontos* (a tooth), in reference to the erect peristome teeth.

Type: *O. lineare* Schwägr.

Apalodium Mitt., *Musc. Austr.-Amer.* 238 (1869). T: *O. pellucens* (Hook.) Mitt.

Stableria (Lindb.) Lindb. ex Braithw., *Brit. Moss Fl.* 2: 140 (1890). T: *S. gracilis* (Bruch, Schimp. & W.Gümbel) Lindb. ex Braithw.

Paroicous or autoicous. Plants minute to small, to 5 mm long, dull or somewhat glossy, erect, often forming dense turfs. Stems unbranched or forked. Rhizoids smooth, reddish. Leaves erect-spreading to spreading, sometimes somewhat secund, linear-setaceous, linear-lanceolate or narrowly lanceolate; margin serrulate near the apex, lacking a border; costa single, ending below or in the apex; upper median laminal cells elongate-hexagonal to rhomboidal, with thin or firm walls. Gemmae not produced.

Perigonia small and bud-like, often tinged with red, on short branches (in autoicous species) below the perichaetia, numerous; perigonial leaves short-acuminate from an ovate base. Perichaetia terminal on main stems, sometimes also on short lateral branches; perichaetial leaves scarcely differentiated (leaves gradually longer toward the top of the plant). Setae erect. Capsules erect, short- to long-cylindrical, less commonly pyriform or almost urceolate, with a small and inconspicuous or \pm elongate sterile neck, sometimes sulcate when dry; exothelial cells of the urn rectangular, \pm abruptly and conspicuously smaller and very thick-walled near the capsule mouth; annulus poorly developed, in 1 or 2 rows, separating irregularly; operculum conical to oblique-rostrate. Peristome usually double, rudimentary to well developed;

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peristomial formula typically 4: 2: 4; exostome teeth smooth to ±papillose (especially near the apex), bluntly narrow-triangular, rarely rudimentary and irregular, typically hyaline; endostome hyaline, smooth or sometimes papillose above, sometimes rudimentary and adhering to the exostome teeth; basal membrane absent or ±well developed and up to 25–33% the height of the exostome teeth; segments narrow, scarcely tapered to the apex, scarcely keeled and not perforate, in some species rudimentary or absent; cilia absent. Spores small to rather large, ±smooth to coarsely roughened.

A almost cosmopolitan genus of 7–10 species, primarily in tropical and southern-temperate regions; two species occur in Australia.

Orthodontium can be recognised by the narrow, setaceous to linear-lanceolate leaves and erect capsules with variously reduced peristome teeth. In Australian plants, the exostome teeth can be shorter than the well-developed endostome segments (*O. lineare*), or the endostome is rudimentary and adhering to the inner surface of the teeth (*O. pallens*). Australian specimens are generally autoicous, but perigonia are sometimes difficult to find, and some dioicous plants may occur.

References

Hedenäs, L., Herben, T., Rydin, H. & Söderström, L. (1989), Ecology of the invading moss species, *Orthodontium lineare* in Sweden: spatial distribution and population structure, *Holarctic Ecol.* 12: 163–172.

Margadant, W.D. & Meijer, W. (1949), Preliminary remarks on *Orthodontium* in Europe, *Trans. Brit. Bryol. Soc.* 1: 266–274.

Meijer, W. (1952), The genus *Orthodontium*, *Acta Bot. Neerl.* 1: 1–80.

Plants small to medium-sized; setae (10–) 20–35 mm long; endostome segments well developed, as long as or longer than the exostome **1. *O. lineare***

Plants minute; setae 5–15 mm long; endostome rudimentary, forming an irregular membrane ±adhering to the exostome teeth; segments absent, rarely linear, delicate and irregular **2. *O. pallens***

1. *Orthodontium lineare* Schwägr., *Sp. Musc. Frond.*, Suppl. 2, 2: 124 (1827)

Apalodium lineare (Schwägr.) Mitt., *Pap. Sci. Res. Voy. Challenger, Bot.* 1(3): 198 (1885). T: Cape of Good Hope, South Africa, *A.Menzies s.n.*; holo: G, *n.v. fide* W.Meijer, *Acta Bot. Neerl.* 1: 27 (1952).

Orthodontium australe Hook.f. & Wilson, *London J. Bot.* 3: 545 (1844). T: Falkland Is., *J.D.Hooker s.n.*; holo: BM.

Orthodontium sulcatum Hook.f. & Wilson, in W.J.Hooker, *Icon. Pl.* 8: pl. 739B (1845); *Apalodium sulcatum* (Hook.f. & Wilson) Mitt., *Trans. & Proc. Roy. Soc. Victoria* 19: 65 (1882); *O. lineare* subsp. *sulcatum* (Hook.f. & Wilson) Meijer, *Acta Bot. Neerl.* 1: 34 (1952). T: W.A., *J.Drummond s.n.*; holo: BM.

Orthodontium lanceolatum Mitt., *Hooker's J. Bot. Kew Gard. Misc.* 8: 261 (1856); *Apalodium lanceolatum* (Mitt.) Mitt., *Trans. & Proc. Roy. Soc. Victoria* 19: 65 (1882). T: Mt Wellington, Tas., *F.Mueller 61*; holo: NY.

Orthodontium robustiusculum Müll.Hal., *Hedwigia* 37: 85 (1895); *O. australe* subsp. *robustusculum* (Müll.Hal.) Meijer, *Acta Bot. Neerl.* 1: 40 (1952). T: Tas., 1889, *W.A.Weymouth s.n.*; iso: NSW.

Orthodontium zetterstedtii Müll.Hal., *Hedwigia* 37: 85 (1898). T: N.S.W and Vic.; collections by *D.Sullivan, T.Whitelegge* and *J.E.Zetterstedt*; iso: MEL; Woollabra [Woollahra], Sydney, [N.S.W.] 1884, *T.Whitelegge*.

Illustrations: W.Meijer, *Acta Bot. Neerl.* 1: 31, 33, 35–37, 43, figs 6–10 (1952).

Autoicous or rarely paroicous, or apparently dioicous. Plants small to medium-sized, dull to ±glossy. Leaves linear-setaceous to linear-lanceolate, occasionally more broadly lanceolate, sometimes slightly secund, serrulate to subentire near the apex; upper laminal cells elongate-hexagonal to long-rhomboidal, 75–190 × 7–17 µm, with thin to firm or sometimes thickened walls; basal cells lax and thin-walled to inflated.

Setae (10–) 20–35 mm long. Capsules erect, typically cylindrical, more rarely ovate-cylindrical or narrowly pyriform, to c. 4.5 mm long, often ±sulcate. Peristome double, well

developed; exostome teeth tapered from base to apex, 150–375 µm long, blunt or ±narrowly acute, hyaline, smooth or ±papillose near the apex; endostome hyaline; basal membrane scarcely exceeding the capsule rim or up to one-third the height of the exostome teeth; segments well-developed, 130–325 µm long, smooth or ±papillose near the apex. Spores 13–19 µm, finely roughened. *n* = 22, *fide* H.P.Ramsay, *Austral. J. Bot.* 22: 312 (1974).

Widely distributed and rather common in W.A., S.A. N.S.W., A.C.T., Vic. and Tas.; grows on rotting or burned wood. Also known from South America, southern Africa and New Zealand.

W.A.: Torbay Hill Rd, *G.Bell* 391 (AD). S.A.: Clarendon, *O.Tepper* 640 (MEL). N.S.W.: La Perouse, *W.Forsyth* 3960 (NSW). A.C.T.: Tidbinbilla, *D.G.Catcheside* 75.58 (AD). Vic.: 5 km SW of Bendoc, *H.Streimann* 43676 (CANB). Tas.: Mt Wellington, *R.A.Bastow* 287 (MEL).

This moss is extremely variable in almost all features, but the peristome is comparatively well developed compared to *O. pallens*.

There are no distinguishing features to separate *O. lineare*, *O. australe* and *O. sulcatum*. Variation in plant size, leaf shape, capsule form (sulcate or not) and peristome development seems to occur independently, such that these taxa cannot be separated by any recurring suite of characters.

Orthodontium lineare was first collected in England in 1911–12 and is now fairly common in many areas of western Europe and southern Scandinavia. It provides one of the most thoroughly studied cases of a weedy moss whose range has greatly expanded during recent times.

2. *Orthodontium pallens* (Hook.f. & Wilson) Broth., *Nat. Pflanzenfam.* I, 3: 544 (1903)

Weissia pallens Hook.f. & Wilson, in J.D.Hooker, *Icon. Pl. Rar.* 8: pl. 739A (1845). T: W.A., *J.Drummond s.n.*; holotype: BM.

Apalodium inflatum Mitt., *Rep. Sci. Res. Voy. Challenger, Bot.* 1(3): 198 (1885); *Orthodontium inflatum* (Mitt.) Paris, *Index Bryol.* 869 (1897). T: N.S.W., *Rev. R.Collie s.n.*; holotype: NY.

Orthodontium ovale Müll.Hal. ex Broth., *Oefvers. Förh. Finsk. Vetensk.-Soc.* 35: 47 (1893). T: Gosford, N.S.W., *T.Whitelegge* 445; holotype: H.

Apalodium lineare Mitt., *Trans. & Proc. Roy. Soc. Victoria* 19: 65 (1882), *nom. illeg., incl. spec. prior.* (*Weissia pallens* Hook.f. & Wilson, 1845).

Illustration: W.Meijer, *Acta Bot. Neerl.* 1: 44, fig. 11 (1952).

Autoicous. Plants minute to small, to 5 mm, usually dull. Leaves linear-setaceous to linear-lanceolate, sometimes slightly secund, serrulate to subentire near the apex; upper laminal cells elongate-hexagonal to long-rhomboidal, 35–75 × 4–10 µm, with thin to firm walls; basal cells thin-walled, tending to collapse.

Setae (4–) 8–15 mm long. Capsules erect, short-cylindrical or broadly pyriform, rarely almost urceolate, to c. 2.5 mm long, not sulcate. Peristome poorly developed, appearing single although exostome and endostome are usually present; exostome teeth rather short or rudimentary, generally blunt, 65–140 µm long, hyaline, smooth or nearly so; endostome rudimentary, hyaline, usually not forming well-differentiated segments, consisting of an irregular membrane adhering to the inner exostomial surface; segments occasional, slender, smooth, irregular. Spores (15–) 18–30 µm, rather coarsely roughened. Chromosome number not known.

Rare in W.A., N.S.W., A.C.T. and Vic.; grows on burned or rotting wood, sometimes mixed with *O. lineare*. Possibly endemic to Australia, but the species is poorly known.

W.A.: Beedelup Falls, *W.Weber* B33577 (CANB); Darling Bow R., 1913, *Jackson s.n.* (NSW). N.S.W.: near Point Hicks, *H.Streimann* 39667 (CANB). A.C.T.: Tidbinbilla, *H.Streimann* 1423 (CANB). Vic.: Cabbage Tree Ck Flora Reserve, *H.Streimann* 43801 (CANB).

This species is characterised by the very small gametophyte and sporophyte and the narrowly to broadly ovate capsules with a markedly reduced peristome. The capsules of *O. pallens* are not sulcate as in most forms of *O. lineare*; they are also smaller. The endostome appears to be absent, but consists of a transparent membrane that adheres to the exostome. It either tears

between the exostome teeth or is only formed adjacent to the teeth; no separate basal membrane is visible.

This species can be difficult to distinguish from very small forms of *O. lineare*, especially when fresh capsules with mature peristomes are not available. *Orthodontium pallens* is far less common, and the relationship between the two species requires further study. Occasional specimens [e.g. *Watts 1087* (NSW); *Catcheside 72.176* (AD), duplicate at NSW] that agree in size and capsule shape with *O. pallens* have a few well-formed endostome segments (i.e. a single capsule might have one long segment with the remaining segments rudimentary).