



PARMOTREMA ¹

Gintaras Kantvilas ²

Parmotrema A.Massal., *Atti Reale Ist. Veneto Sci. Lett. Arti ser.* 3, 5: 248 (1860).

Type: *P. perforatum* (Jacq.) A.Massal.

= *Rimelia* Hale & A.Fletcher, *Bryologist* 93: 23 (1990); type: *R. cetrata* (Ach.) Hale & A.Fletcher

Thallus foliose, with lobes broadly rounded, flattened, dorsiventral, with or without black, chiefly marginal cilia; upper surface typically whitish grey or pale greenish grey, rarely yellowish, with or without maculae that can form a network of fine cracks, sometimes with soredia, ciliate isidia or dactyls, lacking pseudocyphellae, corticate, with a pored epicortex; lower surface black, rhizinate apart from a broad, naked, brown, marginal zone 1.5–4 mm wide; rhizines simple or branched; medulla white or rarely pigmented. Photobiont trebouxoid. Ascomata apothecia, lecanorine, laminal, often ± pedicellate; disc plane to concave, sometimes centrally perforate, pale to dark brown, epruinose; proper exciple in section cupulate. Asci 8-spored, of the *Lecanora*-type: clavate, with a well-developed, amyloid tholus, pierced entirely by a narrow, non-amyloid *masse axiale* with parallel flanks; ocular chamber not developed. Paraphyses 1–2 µm thick, straight, sparsely branched; apices swollen to 3–5 µm. Ascospores simple, hyaline, broadly ellipsoid, with a distinct wall mostly to c. 1 µm thick. Conidiomata pycnidia, laminal, immersed, black and speck-like; conidia highly variable, commonly filiform, bacilliform or cylindrical. Chemistry: atranorin, chloroatranorin and sometimes usnic acid in the cortex; the chemistry of the medulla is complex and includes a wide range of substance types; salazinic or stictic acid are the most common medullary compounds in Tasmanian species.

A genus of about 350 species of large, conspicuous foliose lichens, with the greatest diversity in the tropics, especially the Pacific region and South America. Chemical composition is critical in distinguishing most species. *Parmotrema* as currently circumscribed brings together several groups of foliose lichens with a pored epicortex, broad, frequently marginally ciliate lobes with a broad, naked marginal zone on the lower surface, and thick-walled ascospores. These have, at various times, been recognised as distinct genera due to minor morphological differences, and include *Canomaculina*, *Concamerella* and *Rimeliella* (not represented in Tasmania), and *Rimelia*. This circumscription is supported by molecular data (Blanco *et al.* 2005), which also show that the genus is most closely related to *Flavoparmelia*. The Tasmanian species are usually easily distinguished at generic rank by their large, usually rather loosely attached, foliose thallus of broadly rounded lobes. They are found on rocks, bark or wood in most vegetation types.

Key references: Blanco *et al.* (2005); Elix (1994); Hale & Fletcher (1990); Kantvilas *et al.* (2002).

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|------|--|----------------------------|
| 1 | Thallus lacking soredia, isidia or pustules that become abraded and sorediate | 2 |
| | Thallus sorediate from the outset, or developing soredia from abraded pustules or isidia | 3 |
| 2(1) | Upper surface ± smooth, reticulate-maculate but remaining intact | 2 <i>P. cetratum</i> |
| | Upper surface rather wrinkled, with a network of maculae developing areoles of cortex that flake off, exposing the medulla | 1 <i>P. austrocetratum</i> |

1 This work can be cited as: Kantvilas G (2023). *Parmotrema*, version 2023:1. In MF de Salas (Ed.) *Flora of Tasmania Online*. 6 pp. (Tasmanian Herbarium, Tasmanian Museum and Art Gallery: Hobart). <http://flora.tmag.tas.gov.au/lichen-genera/parmotrema/>

2 Tasmanian Herbarium, Tasmanian Museum & Art Gallery, PO Box 5058, UTAS LPO, Sandy Bay, TAS 7005, Australia.

3(1) Thallus isidiate, or with isidia that soon break down into coarse soredia; cilia laminal and marginal	4
Thallus sorediate; cilia marginal only	6
4(3) Medulla K-, KC+ red, UV+ white (containing alectoronic acid); cilia mostly > 2.5 mm long	5 <i>P. mellissii</i>
Medulla K+ yellow, KC-, UV- (containing stictic acid); cilia mostly < 1.5 mm long	5
5(4) Lower part of medulla with a thin, orange-pigmented, K+ purple zone (containing euplectin); isidia soon breaking down into coarse soredia	7 <i>P. ochrocrinitum</i>
Medulla white throughout, lacking euplectin; isidia generally becoming coralloid and remaining intact	4 <i>P. crinitum</i>
6(3) Medulla K+ yellow→red (containing salazinic acid); upper surface maculate and marked with a network of conspicuous cracks	7
Medulla K+ yellow (stictic acid) or C+ red (lecanoric acid); upper surface not maculate or conspicuously cracked	8
7(6) Thallus wrinkled, with a flaking upper cortex; soredia arising from abraded pustules and cracks in the upper surface, very coarse, becoming schizidiate and spreading across the thallus	6 <i>P. neopustulatum</i>
Thallus smooth or only moderately wrinkled, with the upper cortex mostly intact; soredia farinose to granular, mostly arising in ± discrete, marginal or submarginal soralia	9 <i>P. reticulatum</i>
8(6) Medulla C-, K+ yellow (containing stictic acid); lobes 1.5–10 mm wide	8 <i>P. perlatum</i>
Medulla C+ red, K- (containing lecanoric acid); lobes to 20 mm wide	3 <i>P. cooperi</i>

1 *Parmotrema austrocetratum* Elix & J.Johnst.

Mycotaxon 31: 495 (1988); —*Rimelia austrocetrata* (Elix & J.Johnst.) Hale & A.Fletcher, *Bryologist* 93: 26 (1990).

Morphologically and chemically similar to *P. cetratum* (below). It differs in that the upper surface is more wrinkled, and the network of maculae become deep cracks in the upper cortex and develop areoles that lift at the margins and flake off to expose the medulla. Apothecia are unknown in Tasmanian specimens. This species is widespread in eastern Australia, and is also recorded from the North Island of New Zealand and Norfolk Island. It appears to be uncommon in Tasmania and is known only from Flinders Island.

Flinders Island, Darling Range, S of summit of Walkers Hill, 40°04'04"S 148°05'09"E, 422 m, 2004, *J.S. Whinray* L4199 (CANB, HO, MEL); Darling Range, SW of Mt Counsel, 40°06'40"S 148°05'57"E, 390 m, 2005, *J.S. Whinray* L4276 (CANB, HO).

2 *Parmotrema cetratum* (Ach.) Hale

Phytologia 28: 335 (1974); —*Parmelia cetrata* Ach., *Syn. Meth. Lich.*: 198 (1814); *Rimelia cetrata* (Ach.) Hale & A.Fletcher, *Bryologist* 93: 26 (1990).

Thallus loosely adnate, forming extensive, spreading, pure colonies potentially several metres across, lacking soredia, isidia or dactyls; lobes 4–15 mm wide, undulate, loosely imbricate, rather crumpled; apices and margins entire and ± rounded or, more commonly, incised and with rounded axils, ascending or involute and revealing the dark lower surface, with abundant, black cilia to 1.5(–2) mm long; upper surface whitish grey, usually blotched with black where the cortex is abraded and the medulla discoloured, smooth or slightly wrinkled, maculate, with the maculae forming a reticulate pattern of fine cracks but with the cortex remaining intact; medulla white. Apothecia 2–10 mm wide, at first rather funnel-shaped but soon with the disc widely exposed, concave to plane, brown, entire when young, becoming centrally perforate; margin at first involute, persistent, crenulate to radially cracked. Ascospores (10–)11–12.9–15 × 7–8.1–9.5(–10) μm. Pycnidia very abundant, especially towards the lobe tips; conidia filiform, straight, 10–14 × 1 μm.

Chemistry: atranorin, chloroatranorin, salazinic acid (major) and consalazinic acid (minor); medulla K+ yellow→red, KC-, C-, P+ orange.

Locally common on large rock outcrops, mostly along the eastern and northern coasts, but also found inland, especially on low pinnacles in dry sclerophyll forest. It is frequently the dominant lichen on the tops

of large, flat boulders, where it forms very extensive swards of blotched black and white, easily dislodged lobes, beset with whisker-like, black, marginal cilia. It is widespread in temperate and subtropical regions of the world.

Coles Bay foreshore, 42°09'S 148°17'E, 5 m, 1970, G.C. Bratt 70/362 (HO); Gunners Quoin summit, 42°46'S 147°20'E, 440 m, 1992, G. Kantvilas 180/92 & J. Elix (HO); Slaves Bay, 40°55'S 144°39'E, 15 m, 2001, G. Kantvilas 1216/01(HO).

3 *Parmotrema cooperi* (J.Steiner & Zahlbr.) Sérus.

Bryologist 87: 4 (1984); —*Parmelia cooperi* J.Steiner & Zahlbr., *Bot. Jahrb. Syst.* 60: 528 (1926).

Thallus loosely to rather tightly adnate, 100–150 mm wide, sorediate; lobes to 20 mm wide, undulate, imbricate, rather crumpled; apices and margins entire and ± rounded or crenate, ascending or involute and revealing the pale brown to black lower surface; cilia absent or scattered, 0.5–1.5 mm long; soredia granular, whitish, marginal or submarginal, occurring in linear to oval soralia, elevated at the margins of erect or ascending, involute lobes; upper surface whitish grey to pale greenish grey, smooth to markedly wrinkled and cracked, especially in older parts, faintly mottled-maculate; medulla white. Apothecia and pycnidia unknown in Tasmania, the former reported as having an imperforate disc.

Chemistry: atranorin, chloroatranorin, lecanoric acid; medulla K–, KC+ red, C+ red, P–.

A widely distributed species, reported from scattered localities in Africa, Asia and Australia. Its Tasmanian distribution is limited to the Bass Strait islands where it is a rare epiphyte in coastal scrub. It is unequivocally distinguished by its chemistry, but also differs from *P. perlatum* and *P. reticulatum* by the generally more robust thallus and broader lobes.

Storehouse Island, 15–20 m, 1967, J.S. Whinray s.n. (MEL); Babel Island, 1967, J.S. Whinray s.n. (MEL); Long Islet, Hogan Group, 34 m, 1973, J.S. Whinray s.n. (MEL).

4 *Parmotrema crinitum* (Ach.) M.Choisy

Bull. Mens. Soc. Linn. Soc. Bot. Lyon 21: 175 (1952); —*Parmelia crinita* Ach., *Syn. Meth. Lich.*: 196 (1814).

Morphologically and chemically very similar to *P. ochrocrinitum* (below), from which it differs chiefly by lacking the orange-yellow pigment euplectin, perceived as a thin layer in the lower medulla. In addition, the isidia of *P. crinitum* become coralloid and tend not to readily break down into coarse soredia, as they do in *P. ochrocrinitum*.

This cosmopolitan species is known from a single collection from a *Melaleuca ericifolia*-dominated swampy woodland. It is listed as 'Rare' under the *Tasmanian Threatened Species Protection Act 1995*.

Robbins Island Track, just N of Denium Hill, 40°45'S 144°53'E, 2 m, 1993, J. Elix 40290 & G. Kantvilas (CANB, HO).

5 *Parmotrema mellissii* (C.W.Dodge) Hale

Phytologia 28: 337 (1974); —*Parmelia mellissii* C.W.Dodge, *Ann. Missouri Bot. Gard.* 46: 134 (1959).

Thallus loosely attached, to 100 mm wide, isidiate-sorediate; lobes 1.5–5.5 mm wide, undulate, imbricate; apices and margins entire and ± rounded or crenate, with cilia very abundant, straight or flexuose, to 3.5 mm long; isidia laminal and marginal, coralloid, very soon becoming abraded and coarsely sorediate, ciliate; upper surface whitish grey, smooth or weakly wrinkled, not maculate but often with scattered, faint cracks; medulla white. Apothecia and pycnidia not seen, the former reported as having an imperforate disc.

Chemistry: atranorin, chloroatranorin and alectoronic acid; medulla K–, KC+ red, C–, P–, UV+ white.

Recognised by the chemical composition (unique amongst Tasmanian species), the isidiate-sorediate thallus and the long cilia. This species is very rare in Tasmania and is known from a single, large granite outcrop in

dry sclerophyll forest on the East Coast. It is globally widespread and is also known from the Americas, New Zealand, the eastern Australian mainland, Africa, Asia and the Atlantic islands.

Road to Ansons Bay, 41°15'S 148°10'E, 80 m, 2001, G. Kantvilas 262/01 (HO); *ibid.*, 2020, G. Kantvilas 118/20 (HO).

6 *Parmotrema neopustulatum* Kurok.

J. Jap. Bot. 81: 252 (2006); —*Rimelia pustulata* Elix & Bawingan, *Mycotaxon* 81: 252 (2002); *Parmotrema pustulatum* (Elix & Bawingan) O. Blanco *et al.*, *Mycologia* 97: 157 (2005), *nom. illegit., non Parmotrema pustulatum* Louwhoff & Elix, *Mycotaxon* 75: 199 (2000).

Chemically identical and similar to *P. reticulatum* (below) with respect to the morphology of the thallus, but differing in the nature of the upper surface which is more wrinkled and cracked, with the cracked maculae developing areoles that peel up from the edges and ultimately flake off; soredia granular, coarse, ultimately schizidiate, developing submarginally from abraded pustules or at the edges of the cracks and spreading across the upper surface. Apothecia very rare, 1.5–5 mm wide; disc imperforate; margin entirely sorediate. Ascospores very rare, 10–14 × 5–7.5 µm. Pycnidia uncommon, laminal; conidia filiform, straight, 9–12 × 1 µm.

Chemistry: atranorin, chloroatranorin, salazinic acid (major) and consalazinic acid (minor); medulla K+ yellow→red, KC–, C–, P+ orange.

Widespread, mainly on exposed rocks in coastal areas, but also sometimes occurring as an epiphyte; also known from mainland Australia and South-East Asia. This species is characterised by the flaking upper cortex, a feature also seen in *P. austrocestratum*, which differs by being esorediate. It is also very similar to *P. reticulatum*, where the cortex remains intact and the soredia are more concentrated in discrete soralia and do not become schizidiate.

Lake Tooms Road, 42°02'S 147°30'E, 400 m, 1974, G.C. Bratt 74/1263 & J.M. Gilbert (HO); Denium Hill at end of Robbins Island Track, 40°45'S 144°53'E, 5 m, 1993, G. Kantvilas 143/93 & J. Elix (HO); Flinders Island, SE of Walkers Lookout, 40°03'S 148°05'E, 390 m, 2014, G. Kantvilas 311/14 (HO).

7 *Parmotrema ochrocrinitum* Elix & J. Johnst.

Mycotaxon 31: 498 (1988).

Thallus relatively tightly adnate, irregularly roundish, to 80 mm wide, isidiate-sorediate; lobes 1.5–5 mm wide, undulate, imbricate; apices and margins entire and ± rounded or crenate, with scattered cilia to 1.5 mm long, ascending, plane or slightly revolute when isidiate/sorediate; isidia laminal and marginal, very densely crowded, rather pustular or granular, with a black tip when intact, soon becoming abraded, coarsely sorediate, sparsely ciliate and potentially dominating almost the entire thallus; upper surface whitish grey, smooth or slightly wrinkled, not maculate but often with faint cracks; medulla mostly white but with a thin, sometimes patchy, orange-yellow, K+ purple layer immediately adjacent to the lower cortex. Apothecia and pycnidia not seen.

Chemistry: atranorin, chloroatranorin, stictic acid (major), plus constictic acid and related substances (minor); euplectin in the pigmented areas; medulla K+ yellow, KC–, C–, P+ orange; pigmented areas K+ purple.

A very distinctive species on account of the granular isidia that break down into a coarse sorediate mass with marginal and laminal, black, whisker-like cilia. The orange layer in the lower medulla is best observed by cutting away the black lower cortex with a razor blade; in some specimens it can be rather patchy, causing potential confusion with *P. crinitum*, which is similar morphologically but lacks this pigment. *Parmotrema ochrocrinitum* has a very narrow habitat ecology in Tasmania, being confined to woodland, scrub and heathland along the north-western and north-eastern coasts. It is mostly epiphytic but has also been seen on rocks. It is also known from mainland Australia, Kangaroo Island and the Bass Strait islands.

Eddystone Point, 41°00'S 148°23'E, 3 m, 1973, G.C. Bratt 73/345 (HO); Slaves Bay, 40°55'S 144°39'E, 15 m, 2003, G. Kantvilas 546/03 (HO); Flinders Island, mouth of North-East River, 39°44'S 147°57'E, 2 m, 2007, G. Kantvilas 96/07 (HO).

8 *Parmotrema perlatum* (Huds.) M.Choisy

Bull. Mens. Soc. Linn. Soc. Bot. Lyon 21: 174 (1952); —*Lichen perlatus* Huds., *Fl. Angl.*: 448 (1762); *Parmelia perlata* (Huds.) Ach., *Methodus*: 216 (1803).

Parmotrema chinense auct.

Thallus loosely to rather tightly adnate, forming extensive, spreading, ± pure colonies of contiguous thalli, sorediate; lobes 1.5–10 mm wide, undulate, imbricate; apices and margins entire and ± rounded, crenate, or incised with rather rounded axils, ascending or involute and revealing the pale brown to black lower surface, with scattered to abundant cilia to 2.5 mm long; soredia granular, white or discoloured grey through abrasion, occurring in linear to oval and rather capitate soralia, elevated at the margins of erect or ascending, involute lobes; upper surface whitish grey to pale greenish grey, smooth or wrinkled here and there, not maculate, with scattered, shallow, fine cracks; medulla white. Apothecia uncommon, 4–8 mm wide, subpedicellate and rather funnel-shaped, with the disc concave, brown, imperforate, roundish or ellipsoid; margin involute, persistent, becoming densely sorediate. Ascospores (19–)20–23.7–28(–30) × (10–)11.5–14.6–17(–18) μm; wall 2–3 μm thick. Pycnidia occasional, laminal; conidia filiform, straight, 6–8 × 1 μm.

Chemistry: atranorin, chloroatranorin, stictic acid (major), plus constictic acid and related substances (minor); medulla K+ yellow, KC–, C–, P+ orange.

Cosmopolitan. Very common and widespread in Tasmania on bark and rock, especially in eucalypt forests in drier, lowland areas. It is particularly common in modified habitats such as on solitary trees in pasture, on exotic trees in parks and gardens, and in roadside scrub. The presence of soredia, in combination with stictic acid, make this species easily recognised. In older thalli, the scattered, fine cracks in the upper surface can resemble the cracked maculae of *P. reticulatum*, which occurs in the same habitats, but that species differs chemically by containing salazinic acid.

Waterfall Bay to Clemes Peak, 43°04'S 147°57'E, 160 m, 1972, G.C. Bratt 72/862 & J.A. Cashin (HO); Maria Island near Darlington, 42°35'S 148°04'E, 20 m, 1981, G. Kantvilas 171/81 (BM, HO); Dasher Falls, 41°24'S 146°25'E, 200 m, 1985, A. Moscal 11053 (HO).

9 *Parmotrema reticulatum* (Taylor) M.Choisy

Bull. Mens. Soc. Linn. Soc. Bot. Lyon 21: 175 (1952); —*Parmelia reticulata* Taylor, in J.T. Mackay, *Fl. Hibern.* 2: 148 (1836); *Rimelia reticulata* (Taylor) Hale & A.Fletcher, *Bryologist* 93: 28 (1990)

Parmelia concors Kremp., *Verh. K. K. Zool.-Bot. Ges. Wien* 30: 337 (1880). Type: Kings (sic.) Island, Australia, A. Neale [lecto, *vide* Hale & Fletcher (1990) — M].

Thallus loosely to rather tightly adnate, forming extensive, spreading, ± pure colonies of contiguous thalli, sorediate; lobes 1.5–12(–15) mm wide, undulate, imbricate; apices and margins entire and ± rounded, crenate, or incised with rather rounded axils, occasionally laciniate, ascending or involute and revealing the pale brown to black lower surface; cilia occasional and scattered, or abundant, rarely absent, to 2.5 mm long; soredia granular, sometimes particularly coarse, white or discoloured grey through abrasion, mostly occurring in linear to oval and rather capitate soralia, usually elevated at the margins of erect or ascending, involute lobes, sometimes also submarginal to laminal and spreading across the lobe apices; upper surface whitish grey to pale greenish grey to discoloured pale brownish grey, occasionally blotched with black, smooth to wrinkled, with a network of white maculae that develop into conspicuous cracks, but with the cortex essentially remaining intact; medulla white. Apothecia not seen. Pycnidia uncommon, laminal; conidia filiform, straight, 10–15 × 1 μm.

Chemistry: atranorin, chloroatranorin, salazinic acid (major) and consalazinic acid (minor); medulla K+ yellow→red, KC–, C–, P+ orange.

Cosmopolitan. Very common and widespread throughout Tasmania, especially in low rainfall areas or near the coast. It occurs on bark, wood or rocks in a wide range of vegetation types (including rainforest and *Melaleuca ericifolia*-dominated swampy woodland) but is most common on rocky bluffs in dry sclerophyll forest. This species is highly variable with respect to the robustness of the thallus, the width of the lobes and the coarseness and disposition of the soredia. It is very similar to *P. neopustulatum*, which differs by having a more wrinkled thallus with a cortex that peels and flakes away in patches, and in having exceptionally coarse, ultimately schizidiate soredia that develop in pustules or cracks in the cortex and spread across the peripheral parts of the lobes. Distinguishing these species can be difficult, however, especially in the case of rather abraded specimens from more exposed habitats. In its typical form, *P. reticulatum* is most similar to *P. perlatum*, from which it can be unequivocally distinguished by a chemical spot test with K. When sparingly sorediate, care is required not to confuse it with *P. cetratum*.

St Marys Pass, 41°34'S 148°12'E, 350 m, 1973, G.C. Bratt 73/621 (AD, HO, MEL); Wanderer River, 42°43'S 145°23'E, 1 m, 1985, A. Moscal 10146 (HO); Flash Tier near Seventeen Acre Creek, 42°36'S 147°53'E, 1990, G. Kantvilas 319/90 (HO).

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