



TEPHROMELA ¹

Gintaras Kantvilas ²

Tephromela M.Choisy, *Bull. Soc. Bot. France* 76: 5222 (1929).

Type: *T. atra* (Huds.) Hafellner

Thallus crustose, commonly with a thin pseudocortex of anticlinal hyphae overlain by a hyaline epinecral layer, rarely inapparent (lichenicolous species); prothallus sometimes present, black to whitish grey, effuse, evident at the thallus margins and between the areoles. Photobiont a unicellular green alga with \pm globose cells 4–15 μ m wide. Ascromata apothecia, with a thalline rim and appearing lecanorine, or biatorine to immarginate, basally constricted or broadly adnate. Disc concave, plane, undulate or convex, black, \pm glossy, epruinose. Proper exciple in section cupulate, in most species pale to intensely golden brown, intensifying yellow in K, laterally composed of paraphysis-like hyphae and often highly reduced to \pm absent, at the base becoming \pm paraplectenchymatous. Hypothecium hyaline to pale yellowish, sometimes highly reduced to absent. Hymenium crimson-pink entirely or in streaks, sometimes interspersed, usually coherent in water and K; amyloid reaction restricted to the asci. Paraphyses robust, strongly conglutinated, simple or sparingly branched, \pm parallel; apices expanded, coated with pigment and a gelatinous sheath. Asci clavate, 8-spored, of the *Biatora*- or *Lecidella*-types: tholus well developed, amyloid, with a weakly amyloid *masse axiale* with \pm parallel flanks, a rounded apex and a more intensely amyloid border adjacent to a short, conical ocular chamber. Ascospores simple, hyaline, ovate to ellipsoid, non-halonate, typically with a prominent wall. Conidiomata pycnidia, immersed. Conidia cylindrical to filiform. Chemistry: atranorin occurs in most species, commonly together with depsidones such as alectoronic acid.

A genus of around 50 species, occurring throughout the world from polar to tropical latitudes, and ranging from littoral to alpine elevations. It colonises rock, wood, bark and soil. A few species are lichenicolous and these have a highly reduced, inapparent thallus. The genus is well characterised by the combination of a distinctly crimson-pink hymenium (*atra*-red: K+ intensifying red, N+ orange), *Lecidella*- to *Biatora*-type asci, and simple ascospores. Apothecial anatomy has been variously interpreted by different authors and is discussed in detail by Kantvilas (2015). The seemingly lecanorine margin seen in many species is interpreted as a thalline cushion that envelopes the otherwise biatorine apothecia. Although superficially different, *Tephromela* is considered to be closely related to *Mycoblastus*, which has similar apothecial anatomy.

Key references: Jatta (1910); Elix (2009, 2013); Fryday (2011); Muggia *et al.* (2013); Kantvilas (2015).

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| 1 | Thallus free-living; apothecia with a thalline margin | 2 |
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| | Thallus saxicolous, containing α -collatolic acid as the major secondary compound; soredia coarsely granular | 4 <i>T. granularis</i> |

1 This work can be cited as: Kantvilas G (2023). *Tephromela*, version 2023:1. In MF de Salas (Ed.) *Flora of Tasmania Online*. 5 pp. (Tasmanian Herbarium, Tasmanian Museum and Art Gallery: Hobart). <https://flora.tmag.tas.gov.au/lichen-genera/tephromela/>

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

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| 4(2) Thallus corticolous, containing alectoronic acid as the major secondary compound | 1 <i>T. alectoronica</i> |
| Thallus corticolous or saxicolous, containing α -collatolic acid as the major secondary compound | 2 <i>T. atra</i> |

1 *Tephromela alectoronica* Kalb

Sauteria 15: 243 (2008).

Thallus free-living, smooth, rimose-areolate to verruculose, sometimes strongly bullate-warty, with individual warts 0.2–0.5 mm wide and to 0.4 mm thick, whitish, pale grey or pale beige-grey, esorediate, forming small, irregular patches to 150 μ m thick which often coalesce to form thalli several centimetres wide; prothallus whitish grey, usually inapparent. Apothecia scattered, sessile, slightly basally constricted, "lecanorine", 0.5–2.5 mm wide; thalline "margin" prominent, entire to crenulate, often slightly inrolled, persistent, concolorous with the thallus, in section to 120–200 μ m thick. Proper exciple 40–60(–100) μ m thick, thickest at the base, becoming excluded at the edges. Hypothecium 20–40(–100) μ m thick. Hymenium 60–130(–160) μ m thick, not inspersed; paraphyses 2–2.5 μ m thick, with apices gradually expanded to 6 μ m; asci 48–60 \times 13–18 μ m, located mostly in the uppermost 60–70 μ m of the hymenium. Ascospores (9–)10–12.7–15(–16) \times (6.5–)7–7.9–9 μ m. Conidia rod-shaped, straight, 13–20 \times 0.8–1.2 μ m.

Chemistry: atranorin and alectoronic acid (major constituents); medulla K– or weak yellowish, KC \pm orange-pink (fleeting), C–, P–, UV+ whitish (in abraded areas).

Characterised by the esorediate, whitish thallus containing atranorin and alectoronic acid as the major chemical constituents and by the "lecanorine" apothecia. It is identical to *T. atra* morphologically and anatomically, and is distinguished only by thallus chemistry. This species is widespread and common in Tasmania. It is exclusively corticolous or lignicolous, with decorticated, bleached eucalypt wood being a particularly common habitat. Although mostly collected in dry sclerophyll forest or exposed sunny habitats such as on fence posts or solitary pasture trees, it also occurs, albeit less commonly, in wetter habitats such as on canopy twigs in rainforest or wet eucalypt forest. It is also known from mainland Australia and South America. *Lecanora atrella* Jatta, based on a tiny, fragmentary type specimen from Tasmania (Jatta 1910), may well be an earlier name for this species.

Mt Stuart Road, 42°53'S 147°18'E, 1893, W.A. *Weymouth s.n.* (HO); Cape Deslacs, 42°59'S 147°33'E, 1980, G. *Kantvilas 235/80* (BM, HO); Mt Murray, 42°28'S 147°59'E, 315 m, 2006, G. *Kantvilas 186/06* (HO).

2 *Tephromela atra* (Huds.) Hafellner

In K. Kalb, *Lich. Neotrop. Exs.* 8: no. 297 (1983).

Thallus and apothecia morphologically and anatomically indistinguishable from *T. alectoronica* (above), and differing from that species only by thallus chemistry. Ascospores 11–13.3–15(–17) \times (5.5–)6–7.5–9 μ m. Conidia 12–22 \times 0.8–1.2 μ m.

Chemistry: atranorin and α -collatolic acid, plus alectoronic acid (minor, usually present) and bourgeanic acid (\pm); medulla K \pm weak yellowish, KC \pm weak orange-pink (fleeting), C–, P–, UV+ whitish (in abraded areas).

Cosmopolitan and found in a wide range of habitats from sea-level to alpine elevations, including heathland, open woodland and wet forest, and on a wide variety of substrata including siliceous and calcareous rocks, bark, wood, peat and soil. Its distribution in Tasmania, where it is widespread and locally abundant, reflects this broad ecological amplitude.

For many years, the epithet "*atra*" accommodated virtually all collections of *Tephromela* from Tasmania (and probably elsewhere) but, more recently, numerous segregates of *T. atra* have been described, especially in Australia, based on variations in thallus morphology and, in particular, chemistry. However, Muggia *et al.* (2013) found that DNA sequence data do not support some of the phenotypically distinct entities recently described as species, and that variation in characters such as slight ascospore size differences, substratum preference, apothecial size and chemistry can be better interpreted as locally developed features that are part of the infra-specific diversity of *T. atra*. In addition to *T. alectoronica* (above), two further *T. atra*-like

segregates have been recorded for Tasmania but are not accepted here: the corticolous *T. bullata* Elix and the saxicolous *T. buelliana* (Müll.Arg.) Kalb (see Kantvilas 2015).

Mt Amos summit, 42°09'S 148°17'E, 300 m, 1968, G.C. Bratt 68/1235 & J.A. Cashin (HO); Penguin Island, 43°21'S 147°22'E, 10 m, 2011, G. Kantvilas 11/11 (HO); Skullbone Plains, 42°02'S 146°19'E, 1000 m, 2012, G. Kantvilas 112/12 (HO).

3 *Tephromela campestricola* (Nyl.) Rambold & Triebel

Biblioth. Lichenol. 48: 169 (1992).

Thallus lichenicolous, inapparent. Apothecia scattered, adnate or basally constricted, biatorine, 0.2–0.5 mm wide. Proper exciple concolorous with the disc, evident only in young, plane apothecia, soon excluded, in section 30–50 µm thick, blue-green, K± intensifying, N+ crimson at the upper, outer edge, increasingly weakly pigmented within, deep yellow-brown in central parts beneath the hypothecium. Hypothecium 40–120 µm thick. Hymenium 45–65 µm thick, separating ± readily in K, typically most intensely pigmented crimson-red in the upper part and often also overlain with bluish green pigment; paraphyses 3–5 µm thick, with apices not greatly expanded but usually heavily caked with a pigment-infused gel; asci 45–50 × 15–20 µm. Ascospores 7–9.7–12 × (4.5–)5–6.4–8(–9) µm. Pycnidia not seen.

Chemistry: nil; all compounds detected originate from the host lichen.

The type specimen of this species is lichenicolous on the thallus of *Lecanora pseudistera* Nyl., a cosmopolitan saxicolous or terricolous species. Tasmanian specimens occur mainly on this host, as well as on the Australian endemic, *L. margarodes* (Körb.) Nyl. All are from exposed, sunny rocks in dry open woodland and grassland.

Sleepy Bay Rd, 2 km W of coast, 42°08'S 148°18'E, 20 m, 1984, G. Kantvilas 451/84 & P. James (BM, HO); c. 1 km NW of Tinderbox, 43°03'S 147°19'E, 160 m, 2015, G. Kantvilas 166/15 (CANB, HO); Spring Bay Mill, "Lispers Corner", 42°32'S 147°56'E, 20 m, 2019, G. Kantvilas 415/19 (HO).

4 *Tephromela granularis* Kantvilas

Herzogia 28: 433 (2015). Type: Tasmania, M-Road (McKays Road), 42°18'S 147°52'E, 370 m, on dolerite boulders on a rocky ridge in open eucalypt forest, 12 August 2015, G. Kantvilas 260/15 (holo—HO!; iso—CANB!, GZU!).

Thallus free-living, granular, pale grey, whitish grey or pale to medium bluish grey; individual granules densely crowded, 0.1–0.25 mm wide, squat to somewhat elongate and isidia-like, becoming abraded and sorediate, at length forming a widespreading, diffuse, coarsely granular sorediate crust 5–10 cm wide and to 1–1.5 mm thick; prothallus lacking. Apothecia scattered, uncommon, basally constricted, "lecanorine", 0.8–2.5 mm wide; thalline "margin" usually prominent, crenulate, inrolled, persistent, entire or becoming abraded-sorediate, greyish and ± concolorous with the thallus, or grey-black to blackened at the upper edge and the sides, in section to 200–250 µm thick. Proper exciple 30–150(–200) µm thick, thickest at the base, becoming excluded at the edges, rarely almost excluded throughout. Hypothecium 20–40 µm thick, sometimes ± excluded. Hymenium 60–95(–150) µm thick, not interspersed; paraphyses 2–3 µm thick, with apices gradually expanded to 4–7 µm wide; asci 45–60(–75) × 13–25 µm, positioned at various heights within the hymenium. Ascospores (10–)11–12.9–15 × (5–)6–7.6–9(–10) µm. Conidia rod-shaped, mostly straight, 15–18(–20) × 1–1.5 µm.

Chemistry: atranorin and α-collatolic acid, plus alectoronic acid (minor, usually present) and bourgeanic acid (±); medulla and soredia K+ yellow, KC+ orange-pink, C–, P–, UV+ whitish (in abraded areas).

Known only from Tasmania and Flinders Island, although likely to have been overlooked elsewhere. It is found mostly on large boulders of dolerite and granite in open eucalypt woodland, with better developed specimens usually growing in more sheltered microhabitats. When fertile, it is easily recognised by the combination of sorediate thallus and the characteristic *Tephromela*-type, "lecanorine" apothecia, with a black disc and prominent thalline margin. However, fertile material is scarce and even specimens with well-

formed fruiting bodies tend to have very few fertile asci. Sterile specimens can be problematic and need to be confirmed chemically, because the sorediate *Mycoblastus coniophorus* (Elix & A.W.Archer) Kantvilas & Elix, which contains perlatolic acid, sometimes occurs on rocks and also has a very similar, bluish grey, granular thallus.

Bisdee Tier, 42°26'S 147°17'E, 640 m, 2009, G. Kantvilas 248/09 (HO); Flinders Island, Mt Strzelecki summit, 40°12'S 148°04'E, 780 m, 2014, G. Kantvilas 219/14 (HO); Chauncy Vale, summit of Devils Elbow, 42°37'S 147°17'E, 510 m, 2017, G. Kantvilas 91/17 (HO).

5 *Tephromela sorediata* Kalb & Elix

In J.A. Elix & K. Kalb, *Australas. Lichenol.* 58: 27 (2006).

Thallus free-living, smooth, rimose-areolate to verruculose, whitish, pale grey or pale beige-grey, sorediate, mostly in small irregular patches 1–3 cm wide that can coalesce into more extensive thalli, sometimes rather patchy and unevenly 50–200(–800) μm thick; soralia initially discrete and \pm circular, 0.2–0.6 mm wide, with a rather ragged rim, at length becoming confluent and covering the entire thallus; soredia farinose, whitish to pale bluish grey; prothallus whitish grey to pale bluish grey, commonly inapparent. Apothecia scattered, sessile, slightly basally constricted, "lecanorine" at least when young, 0.5–2.4 mm wide; disc initially plane, soon becoming undulate and then convex to \pm subglobose; thalline "margin" prominent at first, entire to crenulate, sometimes sorediate, concolorous with the thallus, becoming increasingly excluded in the most convex apothecia and eventually reduced to a thin basal collar. Anatomy of apothecia as for *T. alectoronica* and *T. atra* (above). Ascospores (10–)10.5–12.6–15.5(–16) \times (6–)6.5–8.2–10 μm . Conidia reported (Elix 2009) as 12–17 \times 1 μm .

Chemistry: atranorin and alectoronic acid, rarely also with traces of α -collatolic acid; medulla and soredia K+ yellowish, KC+ orange-pink, C–, P–, UV+ whitish.

Widespread and common in Tasmania, and also reported from the southern Australian mainland. It is a common epiphyte in open dry sclerophyll woodland where it occurs on the trunks and twigs of understorey trees such as *Banksia marginata* and *Acacia dealbata*. It also extends to alpine elevations where it grows on the twigs of a wide variety of heathland shrubs. When fertile, this species is easily recognised, but sterile thalli should be confirmed by chemical means as there are several, superficially similar, sorediate crustose lichens that occur in the same habitats: *Megalospora pauciseptata* (Shirley) Kantvilas & Lumbsch (pannarin, P+ orange), *Buellia griseovirens* (Turner & Borrer ex Sm.) Almborn (norstictic acid, K+ yellow→red), *Mycoblastus campbellianus* (Nyl.) Zahlbr. (virensic acid, P+ red) and *Haematomma sorediatum* R.W.Rogers (atranorin, placodiolic acid, K+ yellow). Although apothecial anatomy in this species is essentially identical to that of *T. atra* and *T. alectoronica*, the gross morphology of the apothecia can be quite different. The apothecial disc may become extremely convex to almost subglobose, with the thalline margin reduced to a thin collar.

8 km S of Kelso, 41°08'S 146°46'E, 40 m, 1968, J.A. Cashin 68/434 (HO); South Sister, lower slope, 41°32'S 148°10'E, 750 m, 2004, J.A. Elix 28704 & G. Kantvilas (CANB, HO); Lost World, Mt Wellington, 42°53'S 147°14'E, 980 m, 2020, G. Kantvilas 78/20 (HO).

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