

Three new species and a new record of buellioid lichens  
(Caliciaceae, Ascomycota) from Tasmania

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Abstract

*Buellia acervicola* Elix & Kantvilas, *B. paradisana* Elix & Kantvilas and *Tetramelas oreophilus* Elix & Kantvilas are described as new to science, and *Buellia macveanii* Elix is reported for the first time from Tasmania.

This paper continues our investigation of *Buellia*-like lichens in Australia. For the more recent additions see Elix *et al.* (2017) and Elix & McCarthy (2018) and references cited therein. In this paper, we describe two new species of *Buellia* in the broad sense and one of *Tetramelas*. Methods are as described in the papers cited above.

New species

1. *Buellia acervicola* Elix & Kantvilas, sp. nov.  
Mycobank No. **MB834658**

Fig. 1

Similar to *Buellia epiaeruginosa* Elix, but differs in having an amyloid medulla, a paler brown hypothecium and smaller ascospores, 10–[12.2]–14 × 6–[7.4]–8 µm.

Type: Australia, Tasmania, Mt Rufus, 42°08'S, 146°06'E, 1415 m alt., on alpine dolerite rocks, *G. Kantvilas 508/14*, 27.xii.2014 (holotype – HO).

*Thallus* crustose, to 20 mm wide and 0.1 mm thick, areolate; areoles dispersed to contiguous, irregular, angular, 0.1–0.4 mm wide; upper surface dull grey to yellow-white, matt, epruinose; prothallus black, prominent at the periphery and between adjacent areoles; photobiont cells 5–15 µm wide; medulla white, lacking calcium oxalate (H<sub>2</sub>SO<sub>4</sub>-), I+ purple-blue. *Apothecia* 0.1–0.5 mm wide, abundant, at first aspicilioid then becoming lecideine at maturity, roundish, scattered, immersed; disc black, epruinose, weakly concave; proper exciple thin, black, persistent, ultimately elevated above the disc, in section 35–40 µm thick, outer part brown-black to partially aeruginose, K-, N+ purple-brown, inner part brown. *Epihymenium* 8–10 µm thick, dark brown to aeruginose-brown, N+ purple-brown. *Hypothecium* 50–70 µm thick, pale brown to brown, K-, N-. *Hymenium* 40–60 µm thick, colourless, not interspersed; subhymenium 10–15 µm thick, pale brown; paraphyses 1.8–2 µm wide, shortly septate, sparsely branched, with apices 4–5 µm wide and olive-brown caps. *Asci* of the *Bacidia*-type, 8-spored. *Ascospores* of the *Buellia*-type, 1-septate, pale brown at first, then dark brown, ellipsoid, 10–[12.2]–14 × 6–[7.4]–8 µm, becoming constricted at the septum, outer wall finely ornamented. *Pycnidia* punctiform, immersed. Conidia elongate-bacilliform, straight, 8–11 × 1–1.5 µm. *Chemistry*: Medulla K-, C-, P-, UV-; lichen substances absent.

*Etymology*: The specific epithet alludes to the habitat of the type specimen, on a rock cairn (*acervus*, meaning “heap”) marking the mountain summit. The cairn is one of a series of more than 200 constructed on Tasmanian mountains by the surveyor James Sprent during the trigonometric survey of Tasmania, undertaken in the mid-19th Century.

Remarks

This new species resembles *B. epiaeruginosa*, in that both have immersed apothecia (at least initially), an aeruginose, N+ purple-brown epihymenium and excipulum, and bacilliform conidia, and they lack lichen substances. However, *B. epiaeruginosa* differs in having a non-amyloid medulla, a brown-black hypothecium and somewhat larger ascospores, 12–[15.0]–20 × 7–[8.9]–11 µm (Elix 2016). In some respects it also resembles the common and widely distributed *Buellia aethalea* (Ach.) Th.Fr. insofar as both have immersed apothecia with an aeruginose epihymenium. However, in *B. aethalea* the medulla reacts K+ yellow then red due to the presence of norstictic acid, and the ascospores are larger, 12–20 × 7–12 µm.

At present the new species is known from the type locality in Tasmania and the Grampian Mountains in Victoria. The habitat of the type specimen, a large dolerite cairn, is very richly colonized by crustose lichens and macrolichens. Other species present in the cairn include *Aspicilia cinerea* (L.) Körb., *Lecanora polytropa* (Ehrh.) Rabenh., *Rhizocarpon bicolor* Elix & P.M.McCarthy, *R. geographicum* (L.) DC. and *Rimularia albotessellata* Kantvilas.

ADDITIONAL SPECIMEN EXAMINED

Victoria. ● Grey Knob, Victoria Range, Grampians, on rock, *R. Filson 5255*, 14.ix.1963 (MEL).

2. *Buellia paradisana* Elix & Kantvilas, sp. nov.

Fig. 2

Mycobank No. **MB834659**

Similar to *Amandinea lignicola* var. *australis* Elix & Kantvilas, but differs in having much smaller ascospores (8–13 × 3–5 µm) and bacilliform conidia, and in containing atranorin and placodiolic acid.

Type: Australia, Tasmania, Paradise, Wind Song Property, 42°21'S, 147°55'E, 30 m alt., on the lignin of an old standing eucalypt at the edge of dry sclerophyll forest, *G. Kantvilas 109/19*, 7.iv.2019 (holotype – HO).

*Thallus* crustose, areolate, dispersed, to 20 mm wide and 0.5 mm thick; individual areoles 0.1–0.2 mm wide; upper surface pale grey to grey-white or pale blue-grey, scurfy-granulose, eroded or with erumpent soralia; prothallus absent; medulla white, lacking calcium oxalate (H<sub>2</sub>SO<sub>4</sub>-), I-; photobiont cells 5–20 µm diam. *Apothecia* 0.1–0.5 mm wide, scattered or crowded, lecideine, broadly adnate to sessile; black, epruinose, plane to weakly convex; proper excipulum distinct, persistent, in section cupuliform, 25–65 µm thick, outer zone dark brown to brown-black, K-, N-, inner zone pale brownish. *Epihymenium* 8–12 µm thick, brown, K-, N-. *Hypothecium* 40–70 µm thick, pale brown, interspersed with oil droplets. *Hymenium* 50–65 µm thick, colourless, not interspersed; paraphyses 1.5–2 µm wide, simple to branched, capitate, with apices 4–5 µm wide, dark brown. *Asci* of the *Bacidia*-type, 8-spored. *Ascospores* at first of the *Buellia*-type, 1-septate, pale brown to brown, ellipsoid, 8–[9.9]–13 × 3–[4.3]–5 µm, ± curved, becoming constricted at the septum; outer spore-wall smooth to minutely roughened. *Pycnidia* immersed, black; conidia bacilliform, 3.5–5.5 × 1 µm. *Chemistry*: Thallus K+ yellow, P+ yellow, C-, UV-; containing atranorin (major), placodiolic acid (minor).

*Etymology*: This species is named after the type locality.

Remarks

Superficially *B. paradisana* resembles sorediate forms of *Amandinea lignicola* var. *australis*, in that both exhibit a pale grey to grey-white or pale blue-grey, scurfy-granulose, eroded to sorediate thallus with broadly adnate to sessile lecideine apothecia. However, the latter can be readily distinguished by its larger ascospores, 11–20 × 5–8 µm, curved, filiform conidia (18–26 × 0.5–1 µm) and by the absence of lichen substances (Elix & Kantvilas 2013). Several Northern Hemisphere species of *Buellia* sens. str. contain atranorin and placodiolic acid, namely *B. arborea* Coppins & Tønsberg, *B. leptoclinoides* (Nyl.) J.Steiner and *B. penichra*

(Tuck.) Hasse, but those three species have an inspersed hymenium, much larger ascospores and esorediate thalli (Bungartz *et al.* 2007; Coppins *et al.* 2009).

At present, the new species is known only from the type locality, a heavily degraded site that was formerly rough grazing ground but now supports scattered, mature eucalypts and copses of gorse (*Ulex europaeus*). The dominant lignicolous lichen in such situations is *Ramboldia stuartii* (Hampe) Kantvilas & Elix, with *Buellia schaeereri* De Not. also present.

**3. *Tetramelas oreophilus*** Elix & Kantvilas, sp. nov. Figs 3, 4  
Mycobank No.: **MB834660**

Similar to *Tetramelas allisoniae* Elix, H. Mayrhofer & Glenny, but differs in containing 6-*O*-methylarthothelin, in having smaller ascospores, 17–[21.2]–26 × 6–[8.2]–10 µm, a thinner hymenium (60–80 µm thick) and a greenish black epihymenium.

Type: Australia, Tasmania, Hartz Peak summit, 43°15'S, 146°46'E, 1250 m alt., on the sheltered eastern face of an alpine dolerite tor, *G. Kantvilas 500/14*, 14.xii.2014 (holotype – HO).

*Thallus* crustose, continuous, rimose-areolate, to 50 mm wide and 0.3 mm thick; areoles irregular, angular, 0.1–1 mm wide; upper surface pale yellow to pale yellow-green, dull, unevenly verrucose-lumpy, epruinose; prothallus black and marginal or not apparent; photobiont cells 7–14 µm wide; medulla white, lacking calcium oxalate, (H<sub>2</sub>SO<sub>4</sub>-), I+ intense purple. *Apothecia* 0.2–1 mm wide, lecideine, separate and ± round to crowded and distorted by mutual pressure, broadly adnate to sessile; disc black, epruinose, weakly concave to plane, becoming convex, undulate or tuberculate with age; excipulum prominent, elevated above the disc but excluded in older, convex apothecia, in section 40–50 µm thick, the outer part dark olive-brown to greenish black, K+ yellow solution, N–; paler brown within. *Hypothecium* 40–50 µm thick, brown to dark brown, subhypothecium brown-black, 120–250 µm thick, K+ yellow; subhymenium 15–20 µm thick, pale brown. *Epihymenium* 9–12 µm thick, dark brown to greenish black, K–, N–. *Hymenium* 60–80 µm thick, colourless, ± with scattered oil droplets; paraphyses 1.5–2.2 µm wide, simple to sparsely branched, with apices 4–6 µm wide and dark brown caps. Asci of the *Bacidia*-type, 8-spored. *Ascospores* initially of the *Callispora*- or *Physconia*-types, then of the *Buellia*-type, 1-septate, brown, ellipsoid to broadly fusiform, 17–[21.2]–26 × 6–[8.2]–10 µm, becoming constricted at the septum, often curved, sometimes with one or two endosepta when mature; outer spore-wall microrugulate. *Pycnidia* immersed, punctiform, conidia bacilliform, 3.5–5 × 1 µm.

*Chemistry*: Thallus K+ yellow, C+ pale orange, KC+ orange, P–, UV+ pale orange; containing 6-*O*-methylarthothelin (major) and atranorin (major, minor or absent).

*Etymology*: The specific epithet refers to the montane habitat of the new species (from the Greek *oreos*, pertaining to mountains).

#### Remarks

The new species has been confused previously with *T. allisoniae* from New Zealand (Elix & H. Mayrhofer 2017) and *T. subpedicellata* (Hue) Elix from Antarctica (Elix 2018), both of which have larger ascospores, a thicker hymenium and different chemistries. Thus *T. allisoniae* has ascospores measuring 19–[23.1]–30 × 7–[10.3]–13 µm, and a hymenium 110–130 µm thick, and contains arthothelin, whereas *T. subpedicellata* has ascospores of 18–[24.2]–33 × 9–[10.8]–13 µm, and a hymenium 80–100 µm thick, and contains atranorin (major) and 6-*O*-methylarthothelin (minor), as well as having a pulvinate growth form. Indeed, the dimensions of the ascospores and hymenium of *T. oreophilus* are most similar to those of *T. darbishirei* (I.M. Lamb) Elix from Antarctica (Lamb 1968; Elix 2018), which has ascospores of 15–[18.8]–23 × 7–[8.6]–10 µm and a hymenium 70–80 µm thick. However, *T. darbishirei* differs in having a suberect, pulvinate thallus and in containing atranorin (major) and 6-*O*-methylarthothelin (minor).

At present, the new species is known only from the type locality, where it grows in a highly sheltered overhang amongst large alpine boulders of dolerite where few other lichens are present. That habitat is rarely investigated, owing largely to the difficulty of collecting saxicolous lichens from such a very hard substratum in a confined space. It was discovered fortuitously as the collector sheltered from driving winds.

#### New record for Tasmania

***Buellia macveanii*** Elix, *Australas. Lichenol.* **78**, 35 (2016)

This species was previously known from New South Wales, the Australian Capital Territory and the South Island of New Zealand (Elix 2016). Characterized by minute, aggregated, yellow to yellow-green areoles, separate or clustered, immersed apothecia, a prominent black prothallus, an amyloid medulla, *Physconia*- then *Buellia*-type, 1-septate, ascospores 11–18 × 6–10 µm, an aeruginose, N+ violet-red epihymenium and by the presence of 6-*O*-methylarthothelin. A detailed description and illustration are given in Elix (2016).

#### SPECIMENS EXAMINED

*Tasmania*. ● Stacks Bluff, 41°38'S, 147°41'E, 1527 m alt., on rock, *J. Adams 72/1166*, 27.x.1972 (HO); ● Mt Mawson, 42°42'S, 146°35'E, 1200 m alt., on exposed dolerite, *G.C. Bratt 2944a & J.A. Cashin*, 4.xii.1965 (HO); ● track to Snowy South, on plateau above Lake Skinner, 42°56'S, 146°40'E, 1230 m alt., on alpine dolerite boulders, *G. Kantvilas 465/14*, 27.x.1972 (HO).

#### References

- Bungartz, F.; Nordin, A.; Grube, U (2007): *Buellia* De Not. in Nash III, TH; Gries, C; Bungartz, F (eds) *Lichen Flora of the Greater Sonoran Desert Region* **3**, 113–179. Lichens Unlimited, Arizona State University, Tempe.
- Coppins, BJ; Scheidegger, C; Aptroot, A (2009): *Buellia* de Not. (1846) in Smith, CW; Aptroot, A; Coppins, BJ; Fletcher, A; Gilbert, OL; James, PW; Wolseley, PA (eds), *The Lichen Flora of Great Britain and Ireland* 2nd edn, pp. 228–238. The British Lichen Society, London.
- Elix, JA (2016): New species of *Buellia sens. lat.* (Physciaceae, Ascomycota) from southern mainland Australia. *Australasian Lichenology* **78**, 32–45.
- Elix, JA (2018): New combinations of *Tetramelas* (Caliciaceae, Ascomycota) and a key to the species in Antarctica. *Australasian Lichenology* **83**, 42–47.
- Elix, JA; Kantvilas, G (2013): New species and new records of *Amandinea* (Physciaceae, Ascomycota) in Australia. *Australasian Lichenology* **72**, 3–19.
- Elix, JA; Mayrhofer, H (2017): New species and new records of buellioid lichens (Physciaceae, Ascomycota) from New Zealand. *Telopea* **20**, 75–84.
- Elix, JA; McCarthy, PM (2018): Three new species and four new records of buellioid lichens (Caliciaceae, Ascomycota) from south-eastern Australia. *Herzogia* **31**, 444–452.
- Elix, JA; Kantvilas, G; McCarthy, PM (2017): Thirteen new species and a key to buellioid lichens (Caliciaceae, Ascomycota) in Australia. *Australasian Lichenology* **81**, 26–67.
- Lamb, IM (1968): Antarctic lichens II. The genera *Buellia* and *Rinodina*. *British Antarctic Survey Reports* **61**, 1–129.

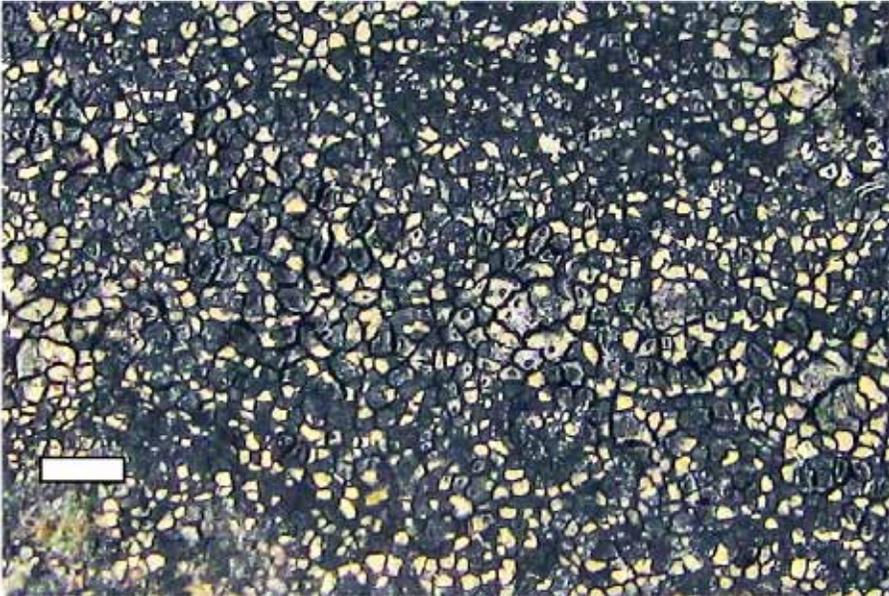


Figure 1. *Buellia acervicola* (holotype in HO). Scale = 2 mm.



Figure 3. *Tetramelas oreophilus* (holotype in HO). Scale = 1 mm.



Figure 2. *Buellia paradisana* (holotype in HO). Scale = 1 mm.

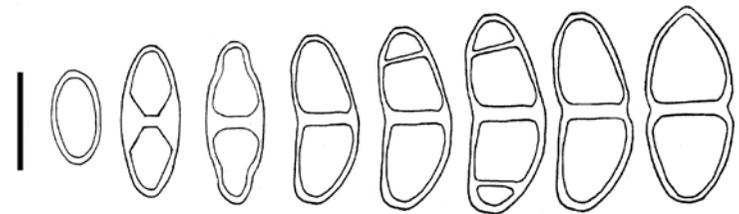


Figure 4. Ascospore ontogeny of *Tetramelas oreophilus*. Scale = 10  $\mu$ m.