

**Two new species of buellioid lichens
(Caliciaceae, Ascomycota) from South Africa**

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Abstract

Buellia magaliesbergensis Elix & H.Mayrhofer and *B. subeffigurata* Elix, H.Mayrhofer & Wetschnig, from South Africa, are described as new to science.

Introduction

Although the biodiversity of microlichens in southern Africa is not particularly well documented, in recent times the region has proved to be a rich source of crustose Caliciaceae (Bungartz & Wirth 2007; Wirth & Bungartz 2009; Wirth 2010; Fryday *et al* 2020; Elix *et al.* 2021). In this paper, we describe two new saxicolous species of *Buellia* in the broad sense from South Africa.

Methods

Observations and measurements of photobiont cells, thallus and apothecium anatomy, asci, ascospores and pycnidia were made on hand-cut sections mounted in water and 10% KOH (K). Asci were also observed in Lugol's Iodine (I), with and without pretreatment in K. Medullary sections were treated with 10% sulfuric acid (H₂SO₄) and apothecial sections with 50% nitric acid (N). Chemical constituents were identified by thin-layer chromatography (Elix 2020) and comparison with authentic samples.

New species

1. *Buellia magaliesbergensis* Elix & H.Mayrhofer, sp. nov.
Mycobank No.: **MB 839188**

Fig. 1

Similar to *Buellia spuria* (Schaer.) Anzi, but differs in having cryptolecanorine then lecideine apothecia with grey-pruinose discs, and by the absence of atranorin.

Type: Republic of South Africa, Orange Free State, Magaliesberg Range, W of Pretoria, Breedsnek, slopes c. 50 m W of summit, 1720 m alt., 25°52'S, 27°26'E, on stones on the ground, *D. Triebel & G. Rambold 8689*, 13.iv.1990 (holotype – M).

Thallus crustose, to 25 mm wide and 0.5 mm thick, rimose-areolate, chinky; areoles rounded to irregular, 0.2–1 mm wide, crowded and contiguous; upper surface off-white, dull to shiny, smooth, convex, epruinose; prothallus black and between areoles or not apparent; photobiont cells 6–24 µm wide; medulla white, lacking calcium oxalate (H₂SO₄⁻), I+ purple-blue. *Apothecia* 0.2–0.6 mm wide, cryptolecanorine but ultimately lecideine, separate and ± round, immersed to just adnate; disc black, grey-pruinose at first then epruinose, plane to convex with age. *Excipulum* distinct, thin, excluded in older, convex apothecia, in section 25–35 µm thick; outer part aeruginose-dark brown or brown-black, K+ red crystals, N+ purple-brown, brown within. *Hypothecium* 50–70 µm thick, pale red-brown merging with the darker brown, central stipe. *Epithemium* 8–12 µm thick, dark olive-brown to dark brown or aeruginose-black, K+ blue-green, N+ weak purple-brown. *Hymenium* 60–80 µm thick, colourless, not interspersed; subhymenium c. 20 µm thick, pale brown, not interspersed. *Paraphyses* 1–2 µm wide, simple to

sparsely branched, the apices 3.5–4.5 µm wide with brown caps. *Asci* *Bacidia*-type, 8-spored. *Ascospores* *Buellia*-type, 1-septate, brown, ellipsoid, 10–[13.4]–16 × 5–[5.9]–7 µm, becoming constricted at the septum, often curved; outer spore-wall finely ornamented (microrugulate). *Pycnidia* common, black, immersed, punctiform. *Conidia* bacilliform to elongate-ellipsoid, 5–7 × 1–1.5 µm.

Chemistry: Thallus K+ yellow, P+ yellow-orange, C–, UV–; containing norstictic acid (major), conorstictic acid (minor).

Etymology: The species is named after the type locality.

Remarks

This species is characterized by the crustose, off-white rimose-areolate thallus with cryptolecanorine then lecideine apothecia with grey-pruinose discs, the amyloid medulla, partially aeruginose, N+ purple-brown excipulum and epithemium, a non-interspersed hymenium, the ellipsoid, 1-septate, *Buellia*-type ascospores, 10–16 × 5–7 µm, and the presence of norstictic acid. *Buellia spuria*, a relatively common South African species, is similar in having *Buellia*-type ascospores of ± the same size and an amyloid medulla, but it differs in having lecideine apothecia with epruinose discs, and it contains additional atranorin (Bungartz *et al.* 2007; Elix 2011).

Buellia magaliesbergensis is known only from the type locality, where it co-occurs with a *Caloplaca* and several *Xanthoparmelia* species.

2. *Buellia subeffigurata* Elix, H.Mayrhofer & Wetschnig, sp. nov.
Mycobank No.: **MB 839189**

Figs 2, 3

Similar to *Buellia halonia* (Ach.) Tuck., but differs in having a subsquamulose thallus with placodioid, subeffigurate margins, larger ascospores, 12–21 × 7–13 µm, and in containing thiophanic acid.

Type: Republic of South Africa, Northern Cape Province, Namaqualand, Knersvlakte, c. 25 km N of Vanrhynsdorp, in the direction of “Douse the Glim”, [SA-Grid: 3118BC], 31°23'S, 18°42'E, 150 m alt., on quartziferous rock, *W. & U. Wetschnig s.n.*, 2.x.1987 (holotype – GZU).

Thallus verrucose-areolate to subsquamulose, to 25 mm wide and 2 mm thick, sometimes forming rosettes to 10 mm wide; areoles rounded, 0.5–3 mm wide, separate to contiguous, irregular, crowded and lumpy within the thallus, but with subeffigurate to placodioid, strongly convex, plicate, marginal lobes 0.4–0.6 mm wide; upper surface off-white to creamy-white, maculate, dull, smooth, convex, epruinose; prothallus not apparent; photobiont cells 6–19 µm wide; medulla white, containing calcium oxalate (H₂SO₄⁺), I–. *Apothecia* 0.3–2 mm wide, lecideine, separate, broadly adnate, round or distorted; disc black, epruinose, plane to markedly convex with age. *Excipulum* distinct but excluded in older, convex apothecia, in section 30–60 µm thick; outer part aeruginose-dark brown, K+ yellow solution, N+ purple-brown, brown within. *Hypothecium* 150–250 µm thick, dark brown to brown-black, K+ yellow solution, N+ orange-brown. *Epithemium* 10–15 µm thick, dark olive-brown to aeruginose-black, K+ blue-green, N+ purple-brown. *Hymenium* 75–100 µm thick, colourless, not interspersed; subhymenium 30–50 µm thick, pale brown. *Paraphyses* 1–2 µm wide, simple to sparsely branched, the apices 3.5–5 µm wide with aeruginose caps. *Asci* *Bacidia*-type, with 8 or fewer spores. *Ascospores* initially *Physconia*- then *Buellia*-type, 1-septate, brown to dark brown, ellipsoid to broadly fusiform, 12–[16.1]–21 × 7–[8.9]–13 µm, sometimes becoming constricted at the septum, rarely curved; outer spore-wall finely ornamented (microrugulate). *Pycnidia* immersed, punctiform. *Conidia* bacilliform to elongate-ellipsoid, 5–8 × 1–1.5 µm. *Chemistry*: Thallus K+ yellow, P+ yellow-orange, C–, UV–; containing thiophanic acid (major), isoarthothelin (minor) and atranorin (minor).

Etymology: The species is named after the subeffigurate marginal lobes.

Remarks

This species is characterized by the off-white to creamy-white, verrucose-areolate to sub-squamulose thallus with placodioid, subeffigurate margins, the broadly adnate, lecideine apothecia, the non-amyloid medulla containing calcium oxalate, the aeruginose, N+ purple-brown epihymenium, a non-inspersed hymenium, the ellipsoid, 1-septate, *Physconia*- then *Buellia*-type ascospores, 12–21 × 7–13 μm, and the presence of atranorin and thiophanic acid. Ascospore ontogeny is very similar to that of *B. halonia*, but the latter has a thinner thallus, a medulla that lacks calcium oxalate, smaller ascospores, 11–19 × 6–9 μm, and it contains isoarthothelin, roccellic acid and atranorin (Bungartz *et al.* 2007; Elix 2011).

Buellia subeffigurata is known from localities in Northern and Western Cape Provinces, South Africa. Associated species include *Buellia halonia* (Ach.) Tuck., *B. namaquaensis* Elix, H. Mayrhofer & Wetschnig and a *Caloplaca* species.

ADDITIONAL SPECIMENS EXAMINED

Republic of South Africa, *Western Cape Province*: • Sandveld W of Richtersveld, c. 9 km ENE of Beauvallon on the Orange River, SE of Brandkaros, 28°29'S, 16°41'E, [SA-Grid: 2816BC], 110 m alt., on greywacke rock, *W. & U. Wetschnig s.n.*, 5.x.1987 (GZU, two collections).

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Figure 1. *Buellia magaliesbergensis* (holotype in M). Scale bar = 2 mm.

Psoroma inflatum, a new alpine lichen from New Zealand

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Figure 2. *Buellia subeffigurata* (holotype in GZU). Scale bar = 1 mm.

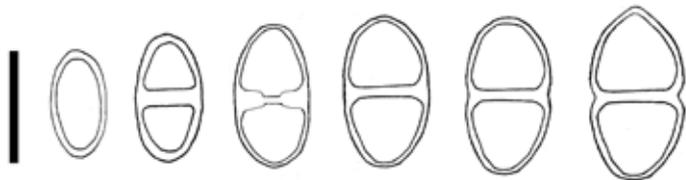


Figure 3. Ascospore ontogeny of *Buellia subeffigurata*. Scale bar = 10 µm.

Abstract

Psoroma inflatum sp. nov. is described from mountains in Canterbury and Otago in New Zealand's South Island. It is related to *P. hypnorum*, but differs in having a strongly inflated and glossy thallus. The squamules are prostrate, ascending or erect, and form brown, coarsely coraloid patches. They lack a dorsiventral morphology and anatomy, in contrast to other *Psoroma* species, except that the lower sides of ascending lobes are less pigmented and have a white tomentum on the cortex, which is less pigmented, thicker and with elongated lumina. The genus *Psoroma* is currently considered to include 11 species in New Zealand, but it is poorly known and very likely includes even more undescribed taxa.

Introduction

Galloway (2007) treated the genus *Psoroma* as comprising 16 species in New Zealand. Since then, two species have been transferred to *Xanthopsoroma* (Elvebakk *et al.* 2010) and one to *Pannaria* (Passo *et al.* 2008), whereas *Psoroma caliginosum* Stirt. and *P. melanizum* Zahlbr. are under study by the author and colleagues as possible members of *Pannaria*. The identity of the true *Psoroma pholidotoides* (Nyl.) Trevis. is still not resolved, and it too might belong in *Pannaria*. However, the name has traditionally been adopted for what is now *Xanthopsoroma contextum* (Stirt.) Elvebakk.

Of the ten species treated by Galloway (2007) and still placed in *Psoroma*, three are corticolous forest species (*P. asperellum* Nyl., *P. coralloideum* Nyl. and *P. geminatum* P.M.Jørg.), four are characteristic alpine species (*P. buchananii* (C. Knight) Nyl., *P. fruticosum* P.James & Henssen, *P. paleaceum* (Fr.) Timdal & Tønsgaard and *P. rubromarginatum* P.James & J.S.Murray), and two are very rare (*P. angustisectum* Zahlbr. and *P. cyanosorediatum* P.M.Jørg.) in addition to *Psoroma hypnorum* (Vahl) S.F.Gray. The latter was described from Norway by Vahl (1787) and is the generic type of *Psoroma*. It is widely distributed, and was considered as “cosmopolitan in cool temperate and arctic-alpine areas” (Smith *et al.* 2009), although “bipolar” as used by Galloway (2007) would describe it more accurately.

In New Zealand *Psoroma hypnorum* has been collected at one montane site in the North Island and ten localities in the South Island, including Old Man Range (Galloway 2007). When I came across a small specimen in the Old Man Range during a visit in 2002, I took it for granted to be *P. hypnorum*. However, later studies, particularly in the three New Zealand herbaria AK, CHR and WELT, have indicated that lichens filed under this name are a very heterogeneous assemblage. So far, I have not seen a single convincing specimen of true *Psoroma hypnorum* in New Zealand. The same is true of Australia, where the species is no longer accepted, and where most of the material represents *P. buchananii* and *P. nigropunctatum* Elvebakk & Elix, a new species (Elvebakk & Elix 2021).

Some specimens deposited in New Zealand herbaria represent a distinct, undescribed species with inflated and strongly glossy squamules. One of the collections is from the Craigieburn Range east of Christchurch, which I visited in 2019 to search for it and two other apparently undescribed Pannariaceae. However, heavy snowfalls restricted the visit to areas just above the tree-line. Still, the species is distinct enough to be described as new based on existing collections, which is the aim of the present contribution.

Material and methods

This paper is based on material from the herbaria AK, CHR, TROM, and W; the species has not been found in other herbaria. Ascospore structures were studied in water mounts and restricted to spores liberated from their asci. Detailed drawings of 35 ascospores from three