Verrucaria ewersii, a new calcicolous lichen from South Australia

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Abstract

Verrucaria ewersii P.M.McCarthy (lichenized Ascomycota, Verrucariaceae) is described from mortar in the Adelaide Plains, South Australia. It has a blackish, areolate or subsquamulose thallus with minute, non-involucrellate perithecia, (0.11–)0.17(–0.23) mm wide, a uniformly blackish excipulum and small ascospores (9–15 × 5.5–7 µm).

Introduction

Verrucaria sens. lat., almost certainly the largest genus of pyrenocarpous lichens, is represented in Australia and its oceanic island territories by 54 known taxa (McCarthy 2012, 2020a), a diversity that is probably less than half of the true number. In this paper, a minute, calcicolous species of *Verrucaria* is described from Dublin, in the Adelaide Plains, South Australia.

Verrucaria ewersii P.M.McCarthy, sp. nov. Figs 1 & 2
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Characterized by the blackish, corticate, areolate or subsquamulose thallus to 0.1(–0.15) mm thick, minute, non-involucrellate perithecia, 0.11–0.23 mm wide, a uniformly blackish excipulum, 14–40 µm thick, a weakly amyloid hymenial gel, periphyses 20–30(–35) × 1.5–2 µm, clavate asci 32–42 × 12–17 µm and small ascospores (9–15 × 5.5–7 µm).

Type: Australia, South Australia, Lofty North, Dublin, reserve opposite old school and beside oval, 34°27'S, 138°21'E, 700 m alt., on mortar, *W.H. Ewers 2423*, 22.i.1988 (holotype – CANB 774799).

Thallus calcicolous, epilithic on mortar but inconspicuous, areolate to subsquamulose (the squamules with slightly raised margins), forming small, scattered or contiguous colonies, primarily greenish black, but with patches of sandy brown to medium greyish green or darker green. *Areoles/squamules* rounded, rounded-irregular or angular, mostly contiguous, occasionally scattered, smooth to minutely uneven, (0.2–)0.3–0.6(–0.8) mm wide, to 0.1(–0.15) mm thick, separated by pale greyish green cracks, corticate. *Cortex* 10–15 µm thick; cells rounded to polygonal, 4–6 µm wide, with rather thick, dark olive-brown walls; cortex subtending an uneven and inconspicuous, hyaline, amorphous, necral layer 5–8 µm thick. *Photobiont cells* dominating the thallus, forming a dense layer to 80(–100) µm deep; cells pale to medium green, unicellular, ± globose, thin- to thick-walled, 6–10(–12) µm diam.; interstitial mycobiont cells parenchymatous, 2–3(–4) µm wide. *Medulla* nondescript, heavily impregnated by substratum material. *Lower cortex* and rhizohyphae absent. *Prothallus* not apparent; hypothallus absent. *Ascomata* perithecia, very numerous (*c.* 150–250 per square centimetre), usually solitary, occasionally paired or in tight clusters of 3 or 4, mostly 1/3–2/3-immersed in the thallus, (0–)1–4(–7) per areole/squamule, (0.11–)0.17(–0.23) mm wide [*n* = 50], dull black, smooth, sometimes partly overgrown by the thallus, appearing convex, hemispherical, subconical or more irregular in surface view (± round or depressed-ovate when sectioned); perithecial apex rounded or somewhat flattened; ostiole inconspicuous, often in a minute, shallow depression 20–30(–40) µm wide; decayed perithecia leaving shallow depressions in the thallus. *Involucrellum* absent. *Excipulum* (20–)25–35(–40) µm thick near the perithecial apex, dark olive-brown to greenish black, K–, with the cells ellipsoid to globose, thick-walled, 5–8 µm wide; lateral and basal excipular walls greenish black, 14–20(–25) µm thick, the former consisting of periclinal cells 5–9 × 3–5 µm, the base formed of more elongate, moderately thick-walled, periclinal cells 7–12(–14) × 2–3.5 µm. *Subhymenium* hyaline, 10–20(–25) µm thick. *Paraphyses* absent. *Periphyses* unbranched to sparingly branched, 20–30 (–35) × 1.5–2 µm, rather long-celled, with narrow lumina and slightly constricted septa, the end-cells often short and subglobose or narrowly clavate. *Hymenial gel* KI+ deep reddish brown, KI+ medium blue (soon fading to colourless). *Asci* 8-spored, narrowly to broadly clavate, 32–42 × 12–17 µm [*n* = 10], the apex with a thin tholus at maturity, lacking an ocular chamber; ascoplasm I+ orange-brown, KI–. *Ascospores* irregularly biseriate or massed in the ascus, simple, colourless, narrowly to broadly ellipsoid or oblong-ellipsoid, ± straight, with rounded ends, (9–)13(–15) × (5.5–)6.5(–7) µm [*n* = 30]; wall *c.* 0.5 µm thick, lacking an epispore; contents clear. *Pycnidia* not seen.

Etymology: The species epithet honours Dr William H. (Bill) Ewers (1934–2005), the collector of the type specimen.

Remarks

The combination of a blackish, areolate or subsquamulose, calcicolous thallus, together with minute, non-involucrellate perithecia with a uniformly blackish excipulum, and small ascospores is diagnostic for *V. ewersii*. *Verrucaria australiensis* P.M.McCarthy, from coastal limestone in south-eastern Australia, has quite similar perithecial morphology and anatomy, but the thallus is endolithic to nondescript and thinly subepilithic, and the perithecia leave pits in the rock following their decay (McCarthy 2012). Another similar species, although one that is known only from consolidated, siliceous soil in south-eastern Australia, *viz. V. kowenensis* P.M.McCarthy, has smaller, simple perithecia, each with a brown-black excipulum apex, but with colourless sides and base, as well as more elongate ascospores, (11–)16(–20) × (5–)6 (–7.5) µm (McCarthy 2020b). The almost pantemperate and commonly lichenicolous *V. compacta* (A.Massal.) Jatta has a much thicker thallus, larger perithecia (to 0.3 mm wide) and subglobose or globose ascospores, 8–13 × 8–11 µm (McCarthy 2012). Perhaps the most similar known species is the calcicolous *V. rupicola* (de Lesd.) Breuss, which appears to be endemic to south-western U.S.A. Apart from a very similar thalline and perithecial anatomy, that lichen has a brown thallus and completely immersed perithecia with only the apices visible as black dots (Breuss 2008).

Verrucaria ewersii is currently known only from calcareous mortar at the type locality in the Adelaide Plains, South Australia. Associated lichens include *Caloplaca aff. mereschkowskiana* S.Y.Kondr. & Kärnefelt, *Lecania turicensis* (Hepp) Müll.Arg. and *Verrucaria muralis* Ach.

References

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Fig. 1. *Verrucaria ewersii* (holotype). Scale: 1 mm.

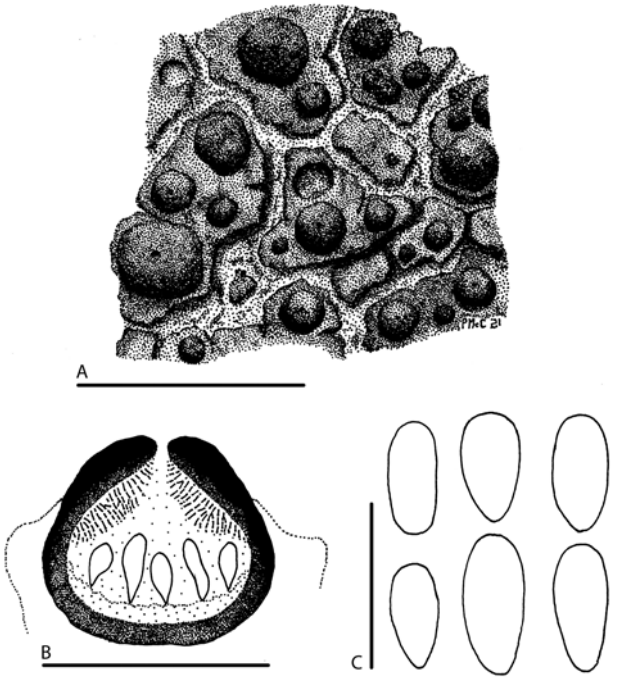

Fig. 2. *Verrucaria ewersii* (holotype). A, Habit of thallus and perithecia; B, Sectioned perithecium (semi-schematic); C, Ascospores. Scales: A = 0.5 mm; B = 0.2 mm; C = 20 µm.