

Agonimia abscondita sp. nov. (lichenized Ascomycota, Verrucariaceae) from New South Wales, Australia

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Abstract

Agonimia abscondita P.M.McCarthy & Elix (lichenized Ascomycota, Verrucariaceae) is described from bark and corticolous bryophytes in cool-temperate rainforest in south-eastern New South Wales, Australia. It has a thin, greenish, microlobulate thallus, immersed perithecia, 0.25–0.45 mm wide, with a concave to plane apex, long periphyses, (1–)4-spored asci and pale yellowish brown, muriform ascospores, 45–95 × 17–32 µm.

Agonimia Zahlbr. (Verrucariaceae), a genus of c. 24 species, is most diverse at northern temperate latitudes, growing on soil, bark and rock and on bryophytes already occupying those substrata. It is characterized by the crustose, squamulose or minutely lobulate thallus, usually with a cortex of papillate cells, simple, perithecioid ascomata with a layered excipular anatomy, 1–8-spored asci, and hyaline to pale brown, muriform ascospores (Sérusiaux *et al.* 1999; Orange & Purvis 2009; Guzow-Krzemińska *et al.* 2012; Orange 2013; Hafellner 2014). In this paper, a new corticolous and bryophilous species is described from cool-temperate rainforest in south-eastern New South Wales.

Methods

Observations and measurements of photobiont cells, thalline and ascomatal anatomy, asci and ascospores were made on hand-cut sections mounted in water. Asci were also observed in Lugol's Iodine (I), with and without pretreatment with potassium hydroxide (K).

Agonimia abscondita P.M.McCarthy & Elix, sp. nov.
Mycobank No.: **MB 826862**

Fig. 1

Thallus corticolous and bryophilous, microlobulate, medium olive-green, 40–80(–120) µm thick; lobules prostrate, richly branched, 0.08–0.2(–0.25) mm long, 40–80(–100) µm wide, to 40 µm thick, matted and obscured in older parts of the thallus; cortex of periclinal, sparingly papillose hyphae or a discontinuous layer of globose, hyaline, papillose cells 9–21 µm wide. Ascomata perithecia, almost completely immersed in the thallus, 0.25–0.45 mm wide, 0.25–0.4 mm tall, subglobose to obpyriform or broadly ovoid, lacking an involucrellum; apex plane to concave. Excipulum layered, predominantly brown-black, 45–65 µm thick. Periphyses 50–120(–150) × 1–1.5 µm. Asci (1–)4-spored, 105–225 × 25–42 µm. Ascospores muriform, pale yellowish brown, 45–95 × 17–32 µm.

Type: Australia, New South Wales, Southern Tablelands, Morton National Park, slopes of Barrengarry Mtn, 6 km ESE of Fitzroy Falls, 34°41'07"S, 150°29'53"E, alt. 480 m, on bark and corticolous bryophytes at base of tree in dense, cool-temperate rainforest, *J.A.Elix 45622*, 16.ix.2008 (holotype — CANB).

Thallus corticolous and overgrowing corticolous bryophytes, continuous and forming colonies several centimetres wide, dull medium olive-green, 40–80(–120) µm thick, lacking soredia and isidia, microlobulate. *Lobules* most clearly distinguishable near the thallus margin, prostrate, 0.08–0.2(–0.25) mm long, 40–80(–100) µm wide, ± smooth, richly and irregularly branched

and imbricate, somewhat flattened and up to 40 µm thick, with lateral, subglobose projections 20–30 µm wide resembling goniocysts. Older, thicker parts of the thallus crust-like, the lobes becoming tightly contiguous or more markedly overlapping and appearing matted, layered in section, most losing their discrete outline, although the thallus surface retaining a very fine, irregular pattern of faint grooves. *Photobiont cells* dominating the thallus, dark green, unicellular, ± globose, thin- to thick-walled, 5–10(–12) µm wide; interstitial mycobiont cells paraplectenchymatous, angular, thin-walled, 3–4(–5) µm wide. *Cortex* often indistinct, especially around newly developing lobes where it forms a single layer of periclinal hyphae 2–2.5 µm wide, the cells smooth-walled or with sparse, convex, conical or tuberculate papillae c. 1 µm tall and wide. Older parts of the thallus with a cortex-like layer of globose, hyaline cells 9–15(–21) µm wide which can form an almost continuous layer or appear more scattered but in the same plane, these cells thick-walled (the wall 1.5–3 µm thick), each with numerous, low-convex to conical papillae c. 3 µm wide and 2 µm tall. Lobes attached to the substratum by long, hyaline rhizohyphae that are long-celled, thin-walled, sparingly branched and 1–2 (–2.5) µm wide. *Prothallus* not apparent. *Ascomata* perithecia, sparse, solitary, 2/3-immersed to almost completely immersed in the thallus and in the spongy outer layers of the substratum, inconspicuous when immature and mature, later often breaking open and then visible as the gaping, black, hollow shell of the excipulum, 0.25–0.4(–0.45) mm wide, 0.25–0.35(–0.4) mm tall [*n* = 10, too destructive of the specimen to measure more], subglobose to obpyriform or broadly ovoid; apex concave to plane, 0.15–0.25(–0.3) mm wide, ± concolorous with the thallus or medium to dark brown, often with a narrow, smooth, raised rim; ostiole usually rather conspicuous, initially pale greyish brown, finally visible as a pore 20–30 µm wide. *Involucrellum* absent. *Excipulum* layered, 50–75 µm thick at and directly below the apex, 45–65 µm thick at the sides and base, with a brown-black, paraplectenchymatous, outer layer 30–45 µm thick at the sides and base, subtended by paler brown to hyaline cells of similar size and shape; inner excipular cells hyaline, elongate-periclinal, forming a layer 10–15 µm thick; laterally, the innermost cells with periphysis-like filaments projecting into the hymenium, these 15–30 × 1–1.5 µm, short-celled, sinuous, branched and sparingly anastomosing; in section the excipular apex with a palisade of hyaline to brown, anticlinal hyphae 15–25 µm long and 1.5–3 µm wide. *Subhymenium* plane to concave, hyaline, 10–20 µm thick. *Paraphyses* absent. *Periphyses* simple or very sparingly branched near the base, 50–120(–150) × 1–1.5 µm, long-celled, with narrow lumina. *Hymenial gel* I+ pale blue, slowly turning red-brown or purple-brown, KI+ pale blue-violet. *Asci* (1–)4-spored, narrowly to broadly clavate, 105–175(–225) × 25–42 µm [*n* = 15], the apex lacking an ocular chamber; ascoplasma I+ orange-brown, KI–. *Ascospores* irregularly biseriate or overlapping-uniseriate in the ascus, muriform, pale yellowish brown, broadly ellipsoid, elongate-ellipsoid, oblong or oblong-fusiform, occasionally soleiform, ± straight, the surface smooth to irregularly undulate, with rounded or somewhat pointed ends, (45–)72(–95) × (17–)25(–32) µm [*n* = 60; 37 in 4-spored asci, 8 in 3-spored asci, 4 in 2-spored asci, 1 in a monosporous ascus, 10 uncertain]; wall c. 1 µm thick, lacking an epispore; locules thin-walled, angular, 3–5(–6) µm wide, (3–)4–5(–6)-sided in optical section, the contents clear or minutely granulose. *Pycnidia* not seen.

Etymology: The epithet *abscondita* (L., hidden, concealed) alludes to the largely immersed ascomata and their very inconspicuous apical parts.

Remarks

Other species of *Agonimia* have either 1–2-spored or mainly 8-spored asci; *A. abscondita* is the first to exhibit predominantly 4-spored asci. Among other microlobulate taxa, *A. pacifica* (H.Harada) Diederich, from Korea, Japan, China, Taiwan, Papua New Guinea, Costa Rica and Brazil, has squamules with proliferating lobules to 50 µm wide, an almost uniformly dark-pigmented excipulum, shorter and thicker periphyses and mostly monosporous asci (Harada 1993; Aptroot *et al.* 1997). *Agonimia flabelliformis* Halda, Czarnota & Guzow-Krzemińska, from Great Britain and Central Europe, has a minutely flabelliform-squamulose to coralloid thallus, prominent, black perithecia to 0.25 mm wide and ascospores 23–35 × 11–15 µm in 8-spored asci (Guzow-Krzemińska *et al.* 2012). Lastly, the corticolous *A. tenuiloba* Aptroot &

M. Cáceres, from Amazonian Brazil, has superficial, grey perithecia with an excipulum to 100 μm thick and shorter ascospores, 30–50(–76) \times 20–35 μm , in bisporous asci (Aptroot & Cáceres 2013).

Two species of *Agonimia* are already known from Australia, but both are readily distinguishable from the new species. The almost cosmopolitan and mainly calcicolous *A. tristicula* (Nyl.) Zahlbr., in south-eastern New South Wales and Lord Howe Island, has a squamulose thallus that is scarcely microlobulate, black, rugose-plicate perithecia, (1–)2-spored asci and ascospores 65–135 \times 30–50 μm (McCarthy 2001). Another widely distributed species, *A. opuntiella* (Buschardt & Poelt) Vězda, has distinctive squamules to 2 mm wide which are covered with minute, hyaline hairs, as well as bisporous asci; it has been reported from south-eastern Queensland by Aptroot (2011).

The new species is known only from the type locality in cool-temperate rainforest in the Southern Tablelands, New South Wales. Associated lichen species include *Bacidia* sp. and *Lepraria squamatica* Elix.

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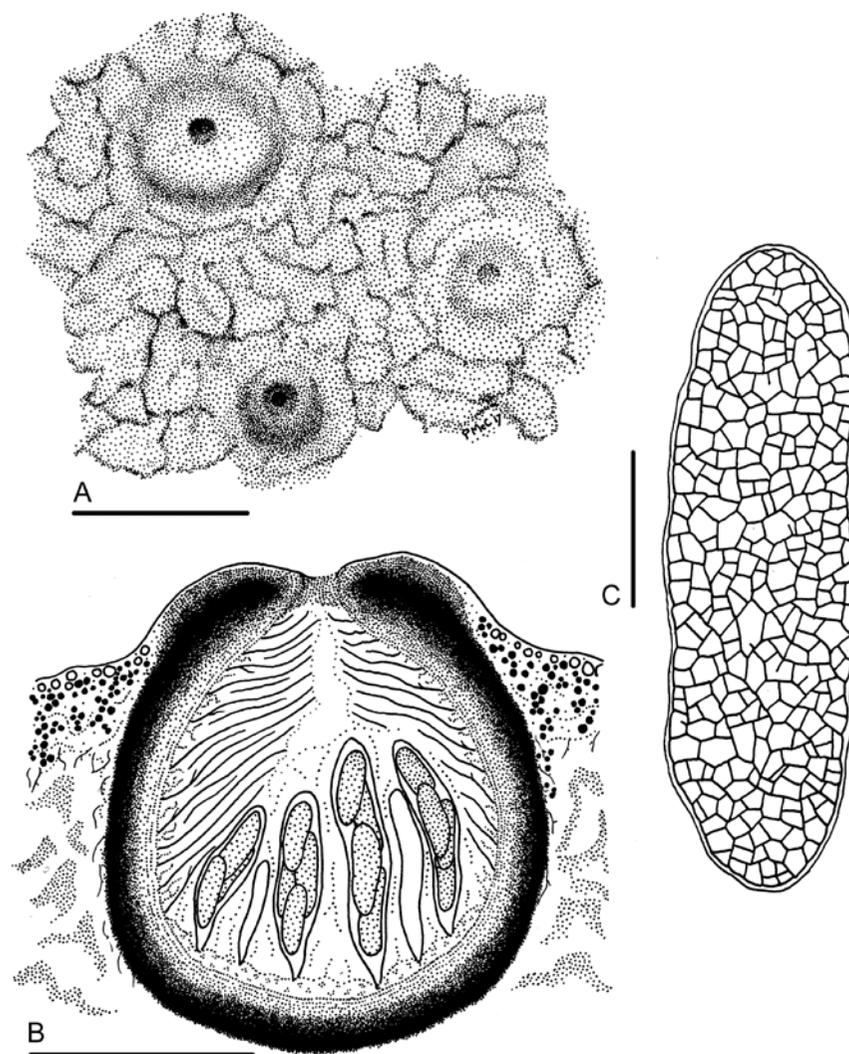


Figure 1. *Agonimia abscondita* (holotype). **A**, Habit of thallus and ascomatal apices; **B**, Sectioned ascoma, with adjacent thallus and substratum (semi-schematic); **C**, Ascospore. Scales: A, B = 0.2 mm; C = 20 μm .