



Pertusaria crassilabra Müll. Arg. – a reinstated name for an Australasian lichen

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Abstract: *Pertusaria crassilabra* Müll. Arg., based on a Victorian type specimen and hitherto considered a synonym of *P. melanospora* Nyl., is reinstated and recorded for south-eastern Australia (including Tasmania) and New Zealand. The species is described and illustrated. *Pertusaria amaurospora* Hellbom and *P. melanospora* var. *sorediata* Elix & A.W.Archer are synonyms of *P. crassilabra*. The occurrence in Australasia of *P. melanospora sens. str.*, based on a type from South America, is considered doubtful.

Keywords: Australia, biodiversity, lichenised fungi, New Zealand, Pertusariaceae

Introduction

Pertusaria DC. is one of the largest genera of lichenised fungi and, with 191 formally recorded taxa, certainly one of the largest in Australia (McCarthy 2017). The genus has been extensively studied in the region, in particular by the Australian lichenologist, Alan Archer, who, alone or in collaboration, compiled several, continent-wide accounts (Archer 1997, 2004; Archer & Elix 2016). Regional studies for Tasmania (Kantvilas 1990, Kantvilas & Elix 2008) and New Zealand (Galloway 1985, 2007) have also been published.

Although most species of *Pertusaria* have colourless ascospores, a small number are known to develop brown or grey-brown spores at maturity or at senescence. One such species is the aptly named *P. melanospora* Nyl. This saxicolous species is based on a type from Chile (Nylander 1855) but has been more widely recorded, including for Australia (Archer 1997) and New Zealand (Archer & Elix 1993) and Southern Africa (Stizenberger 1890). Along the way, several Australasian *Pertusaria* names have been consigned to synonymy with *P. melanospora*; viz. *P. crassilabra* Müll.Arg., *P. amaurospora* Hellbom and *P. limescens* Zahlbr. More recently, Elix & Archer (2013) described a sorediate variety of *P. melanospora*, based on material from Kangaroo Island, South Australia, but also recorded from elsewhere in south-eastern Australia and New Zealand.

The present study is based on a review of Australasian herbarium material filed as *P. melanospora*, field work in Tasmania, Kangaroo Island and New Zealand's North Island, study of specimens of *P. melanospora sens. str.* from South America, and an examination of relevant type material. As a result, a long-disused name, *P. crassilabra* is reinstated for the Australasian taxon, and the occurrence of *P. melanospora* in Australasia is considered doubtful.

Material and methods

Anatomical and morphological observations were undertaken using light microscopy, with thin hand-cut sections mounted in water, 10% KOH, lactophenol cotton blue and ammoniacal erythrosin. Ascospore measurements are presented in the format: 5th percentile–average–95th percentile, with outlying values given in brackets; these are based on 45 observations for each taxon. Routine chemical analyses by thin-layer chromatography follow standard methods in lichenology (Orange *et al.* 2001).

Taxonomy

Pertusaria crassilabra Müll.Arg.

Hedwigia 32: 126 (1893). – **Type:** [Australia] Victoria: Loutit Bay [near Lorne], 1891, *Luehmann s.n.* (holo: G!).

Pertusaria amaurospora Hellbom, *Bih. Kongl. Svenska Vetensk.-Akad. Handl.* 21(3) 13: 73 (1896). – **Type:** New Zealand, South Island, Maunganui, near Taurunga, Dec. 1874, *S. Berggren* [lecto.: S! (L5124), *fide* Galloway 1985; isolecto.: S! (L986, L5125, L5126)].

Pertusaria melanospora var. *sorediata* Elix & A.W.Archer, *Australas. Lichenol.* 73: 8 (2013). – **Type:** Australia, South Australia, Kangaroo Island, Cape St Albans, 35°48'S, 138°07'E, 20 m alt., on laterite in pasture, 24 Sep. 2010, *G. Kantvilas* 176/10 (holo.: HO!; iso.: AD!).

Pertusaria melanospora auct. non Nyl.: A.W.Archer, *Biblioth. Lichenologica* 69: 104 (1997), *Fl. Austral.* 56A: 146 (2004); A.W.Archer & Elix, *New Zealand J. Bot.* 31: 111 (1993), *Austral. Pertusaria* 85 (2016); D.J.Galloway, *Fl. New Zealand Lich.* (ed. 2) 1150 (2007).

Thallus crustose, very tightly adnate, rimose-areolate, dull yellowish or brownish yellow, up to 10 cm wide or more, sorediate; individual areoles 0.1–0.5 mm wide, to 200 (–500) μm thick, plane or slightly convex, contiguous or dispersed over an effuse, patchy, pale greyish prothallus, with an upper cortex 20–30 μm thick, composed of short-celled hyphae 4–5 μm wide; soredia whitish or greenish white, coarse, sometimes becoming elongate, corticate and “pseudoisidiate” at the most mature stage, arising in irregular soralia 0.3–0.5 mm wide, formed by a disintegration of the thallus upper cortex, typically sparse and inconspicuous, but sometimes spreading across the entire thallus; photobiont a unicellular green alga with individual cells globose, 6–14 μm diam. *Apothecia* verruciform, smooth or rather wrinkled, apically flattened, when well developed 0.4–1.3 mm wide, constricted at the base and appearing lecanorine; ostioles mostly 1–4 per verruca, at length gaping, to c. 0.4 mm wide and appearing disc-like. *Epithecium* brownish grey, weakly K+ violet, C+ violet. *Ascospores* 4–8 per ascus, at first hyaline, later bluish grey to brownish, K+ violet, C+ violet, ellipsoid to ovate, 48–58.4–74 (–76) \times 24–31.8–40 (–42) μm ; wall mostly 10–15 μm thick. *Pycnidia* immersed, flask-like, 60–100 μm wide, visible as black specks in the surface of the thallus; conidia filiform, mostly \pm straight, 16–22 \times 0.8–1 μm . **Figs 1–2.**

Chemistry. Arthothelin; thallus K–, KC+ orange, C+ orange, P–, UV+ dull orange. Elix & Archer (2013) also record 4,5-dichloronorlichexanthone, 2,5-dichloronorlichexanthone, 2,4-dichloronorlichexanthone (\pm), thiophanic acid (\pm) and atranorin (\pm) in trace concentrations.

Remarks. *Pertusaria crassilabra* is very distinctive and has no known confusing species within its distributional range. Perhaps the most similar species, on account

of its verruciform apothecia and sometimes yellowish thallus, is *P. lophocarpa* Körb., but this common taxon differs by having an esorediate thallus containing 2'-O-methylperlatolic acid as the major secondary substance, has larger apothecia (to 1–3 mm wide) and colourless ascospores (unpubl. observations and Archer 2004). Fertile material of *P. crassilabra* is rather uncommon (for example, none has been collected in Tasmania) but the yellowish, areolate, C+ orange thallus with scattered soralia is unmistakable. The degree of development of soredia is highly variable. In some specimens, including the type specimens, they are sparse and associated mainly with abraded parts of the thallus. Such a specimen is illustrated by Archer & Elix (2016, Fig. 75) as *P. melanospora* var. *melanospora*. In others, the soredia spread across the entire upper surface and may become elongate, corticate and essentially pseudoisidiate (for example, see Fig. 2). There does not appear to be any obvious correlation between development of soredia and habitat factors and all specimens seen display at least some evidence of soredia. The K+, C+ violet pigment has not attracted comment from previous Australasian workers, although it is noted by Schmitt *et al.* (2006) in their study of some related North American taxa. It is consistently present and displays the same reactions as *sedifolia*-grey of Meyer & Printzen (2000), a pigment that is scattered amongst lichens, occurring, for example, in species of *Micarea* Fr. and *Rimularia* Nyl., and in *Pertusaria erubescens* (Taylor) Nyl.

Although clearly related to *P. melanospora sens. str.* and sharing \pm identical ascospores and thallus chemistry, *P. crassilabra* consistently has a distinctly thinner, chinky-areolate, sorediate thallus, morphological characters that justify recognising these taxa at species rank. In the course of this study, I have examined a wide range of Australasian specimens labelled as *P. melanospora* in various herbaria (as listed below) and found all to be

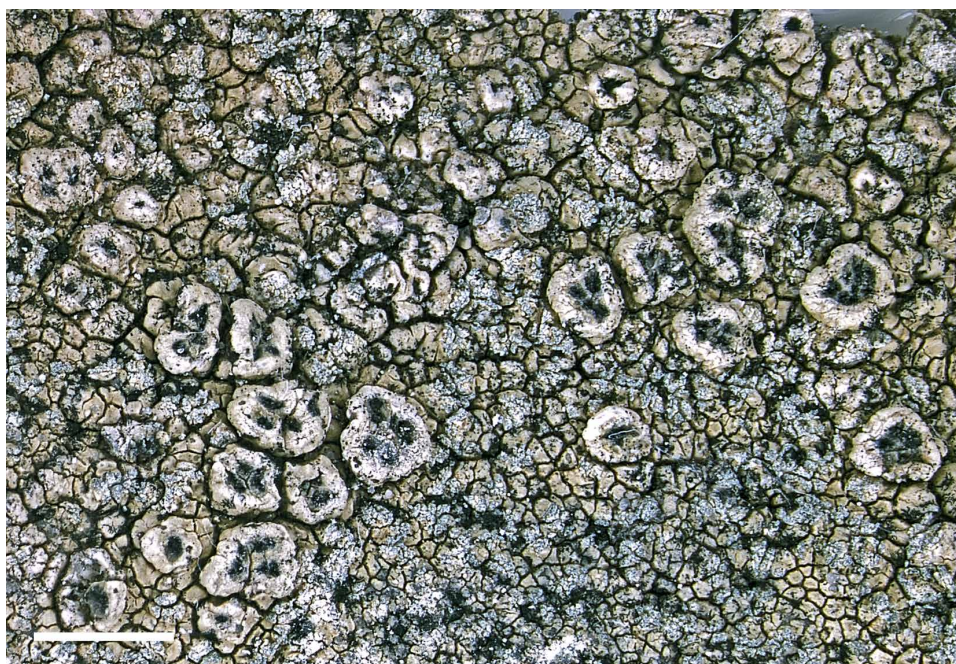


Fig. 1. *Pertusaria crassilabra* habit (Kantvilas 176/10), showing the rimose thallus, scattered soralia and basally constricted, verruciform apothecia. Scale = 2 mm.



Fig. 2. *Pertusaria crassilabra* detail (Kantvilas 176/10). Note the "Lecanora-like" apothecia with multiple, black ostioles, and the coarse, pseudoisidiate soredia (top left). Scale = 1 mm.

sorediate, and therefore matching *P. crassilabra*. The presence of *P. melanospora* in Australasia is thus highly doubtful, given that all specimens cited by Galloway (1985) and Archer & Elix (1993) are sorediate.

The type specimen of *P. amaurospora* is clearly sorediate and conspecific with *P. crassilabra*. Galloway (1985) regarded *Pertusaria limescens* Zahlbr., based on a type collection from New Zealand's South Island, as a synonym of *P. amaurospora*, albeit with some doubt as he did not examine the type collection. Subsequently, both of these taxa were listed as synonyms of *P. melanospora* by Archer & Elix (1993). I am reluctant to accept *P. limescens* as a synonym until authentic material can be located and studied. The original description of Zahlbruckner (1941) makes no mention of certain critical characters, such as, for example, the distinctly yellowish thallus or the pigmented ascospores; instead the thallus is described as K+ reddish, C–, and the spores as uncoloured.

Distribution and ecology. *Pertusaria crassilabra* is known from Kangaroo Island and mainland South Australia, from Victoria, Tasmania, New South Wales, the Australian Capital Territory, and the North and South Islands of New Zealand. It has a very wide distribution on exposed rocks, but chiefly in drier areas and especially at the coast. Elix & Archer (2013) list a suite of lichens with which *P. crassilabra* (under its synonym, *P. melanospora* var. *sorediata*) may be associated with and which indicate its broad ecological amplitude.

Selected specimens examined

TASMANIA. Furneaux Islands, East Kangaroo Island, 40°10'S 147°54'E, 3 m alt., 20.iv.1969, *J.S. Whinray s.n.* (MEL); Cockle Bay Lagoon, 42°42'S 147°56'E, 1 m alt., 24.vii.2011, *G. Kantvilas 218/11* (HO); Spiky Bridge, 42°11'S 148°04'E, 60 m alt., 11.viii.2011, *G. Kantvilas 225/11* (CANB, HO); Gunners Quoin, 42°46'S 147°19'E, 440 m alt., 1.iv.2013, *G. Kantvilas 23/13* (HO); Lucas Point,

Fishermans Haul, 43°02'S 147°20'E, 1 m alt., 8.xii.2013, *G. Kantvilas 407/13* (HO); Cape Surville, 42°57'S 148°00'E, 25.ix.2014, *G. Kantvilas 476/14* (HO); Dorman Point, 42°54'S 147°44'E, 5 m alt., 13.xii.2014, *G. Kantvilas 497/14* (HO); mouth of Interview River, 41°35'S 144°53'E, 3 m alt., 31.i.2015, *G. Kantvilas 140/15* (HO); The Nut, 40°46'S 145°18'E, 2 m alt., 25.x.2016, *G. Kantvilas 399/16* (HO). SOUTH AUSTRALIA. Kangaroo Island: Windmill Bay, 35°51'S 138°07'E, 20 m alt., 17.ix.2012, *G. Kantvilas 469/12* (AD, HO); c. 3.5 km NE of Stokes Bay, 35°37'S 137°13'E, 50 m alt., 19.ix.2012, *G. Kantvilas 536/12* (AD, HO); Western River Cove, W end of beach, 35°40'S 136°58'E, 2 m alt., 27.ix.2015, *G. Kantvilas 413/15* & *B. de Villiers* (HO). VICTORIA. Point Wilson, 15 km NE of Geelong, 38°04'S 144°30'E, iii.1980, *A. Geddes s.n.* (MEL); Lake Condah, 38°04'05"S 141°49'53"E, 28.iii.2011, *V. Stajsic 5724* (MEL, NSW); Phillip Island, Kitty Miller Bay, 38°30'34"S 145°10'20"E, 2.iv.2013, *V. Stajsic 7379* & *J.G. Eichler* (HO, MEL).

NEW ZEALAND, NORTH ISLAND. Waitakere Ranges, Mercer Bay Track, summit of Farley Point, 36°59'S 174°28'E, 10.xi.2016, *G. Kantvilas s.n.* (AK, HO); Union Bay, N end of Karekare Beach, 36°59'12"S 174°28'24"E, 1.5 m alt., 10.xi.2016, *G. Kantvilas s.n.* (AK, HO).

Further specimens from South Australia, New South Wales, the Australian Capital Territory and South Island, New Zealand, held in CANB, are cited by Elix & Archer (2013) and are not repeated here.

***Pertusaria melanospora* Nyl.**

Ann. Sci. Nat., Bot., sér. 4, 3: 159 (1855). – **Type:** Chile, Quilmenco, *C. Gay s.n.* (lecto.: H-NYL 23603!, *vide* Archer & Elix 1993; isolecto: H-NYL 23604!).

A description of this species is provided by Messuti (2005). It is characterised by a relatively thick, continuous, esorediate, yellowish thallus containing arthothelin as the major substance, verruciform apothecia, (4–) 6–8-spored asci and bluish grey to brownish ascospores. Messuti (2005) gives the ascospore dimensions as 55–81 × 30–39 μm; in the present study, these were measured as (36–) 44–57–74 × (24–) 25–31–36 μm ($n = 43$). Both the ascospores and the greyish epithecium react a faint K+ violet, C+ violet.

Messuti & Archer (2003) and Schmitt *et al.* (2006) list several synonyms of *P. melanospora* (*viz.* *P. calcarea* (Nyl.) Nyl., *Melanaria atacamae* C.W. Dodge and *P. ochracea* Kremp.), based on South American types, but these were not examined during the present study; the published descriptions of the taxa make no mention of soredia. The status of the African report of this South American taxon (Stizenberger 1890) remains unresolved.

Specimens examined

CHILE, JUAN FERNÁNDEZ ISLANDS. Isla Robinson Crusoe (Más a Tierra), Gipfel, SW of Tres Puntas, "Vogelgipfel", alt. 380 m. s. m., 5.i.1917, *C. & I. Skottsberg* (S 55391); Santa Clara, northeast coast opposite El Morro del Spartán, 15.xii.1965, *H.A. Imshaug 38182* (S).

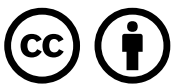
CHILE. Prov. Coquimbo, Küstenkordille, Serra de Frai Jorge, 17.viii.1917, *C. & I. Skottsberg* (S 55390); Valparaíso, Alto del Puerto, 14.viii.1940, *R. Santesson 2997* (S); Prov. Aconcagua, Punto Los Molles, 50 m alt., 13.xi.1976, *W.A. Weber & B. Johnston (Lich. Exsicc. Colo. 545)* (MEL, S).

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