

A new species of *Lepraria* (lichenized Ascomycetes) from Tasmania's wet forests

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Abstract

Lepraria toilenae Kantvilas & Kukwa is described from Tasmania. This species is characterised by a green to grey-green, leprose, non-lobate thallus containing malonprotocetraric, fumarprotocetraric and roccellic acids.

Introduction

The genus *Lepraria* Ach. is well-represented in the Tasmanian flora. McCarthy (2003) records four species for the island: *Lepraria incana* (L.) Ach, *L. lobificans* Nyl., *L. membranacea* (Dicks.) Lettau and *L. vouauxii* (Hue) R.C. Harris, the last two taxa as *Lepruloma* Nyl. ex Crombie, a genus now regarded as a synonym of *Lepraria* (Ekman & Tønsgberg 2002; Kukwa 2002). However, on the basis of chemical composition alone, many more additional taxa appear to be present, containing various combinations of depsides, depsidones, dibenzofurans and fatty acids.

In Tasmania, *Lepraria* is represented in most vegetation types, including wet and dry forests, alpine and coastal heathland, and urban or man-made environments. As in other parts of the world, species of *Lepraria* can inhabit soil, bark, wood or rock, and frequently favour sheltered sites where they are protected from direct sunlight and from wetting by rain. A particularly important habitat is found on the trunks of very old trees and, as a result, some species of *Lepraria* may well serve as old-forest indicators. Ongoing studies in Tasmania's old-growth eucalypt forests have shown one such *Lepraria* species to be abundant on the massive trunks of the oldest trees. This species is new to science and is described here.

Methods

Thallus morphology was studied using low-power microscopy. Anatomical observations at high-power were made on portions of thallus mounted in water. Thin-layer chromatography (TLC) was undertaken using standard methods, specifically solvents A, C and G (Orange *et al.* 2001).

Taxonomy

Lepraria toilenae Kantvilas & Kukwa, *sp. nov.*

Thallus crustaceus, ubique leprosus, elobatus, acidum roccellicum, acidum malonprotocetraricum et substantias affines continens, sorediis farinosis, super hypothallum bene evolutum, album vel griseo-album dispersis; algae chlorococcoideae.

Type: Tasmania, West of Tahune Bridge in the Warra SST, at edge of coupe WR008I, 43°06'S 146°40'E, 90 m altitude, on dry trunk of large *Eucalyptus obliqua* in

wet sclerophyll forest, 10 May 2005, *G. Kantvilas 121/05* (holotype HO; isotypes BG, BM, UGDA).

Thallus leprose-sorediate, thick or thin, lacking well-defined lobes, whitish green to greenish grey, diffuse and forming extensive, irregularly spreading patches to 50 cm wide, less commonly in small, irregularly roundish, \pm delimited colonies *c.* 3–5 mm wide that eventually coalesce; medulla absent; hypothallus very well developed, white or rarely pale greyish white, forming a thick weft covered with soredia except for a soredia-free zone at the thallus margins, composed of branched and occasionally anastomosing hyphae 2.5–4 μm thick with smooth or rough walls; soredia farinose, dispersed over the hypothallus or forming a thick, continuous layer, \pm roundish, 16–40 μm wide, surrounded by an incomplete ‘wall’, sometimes aggregated in roundish to slightly elongated clumps (consoredia) to *c.* 80 μm wide, very rarely with a few projecting hyphae to 15 μm long; photobiont chlorococcoid, with individual cells 5–8(–10) μm diam.

Chemistry: Thallus K-, KC-, C-, P+ red, UV-; containing malonprotocetraric (major), fumarprotocetraric (submajor), protocetraric (minor) and confumarprotocetraric (trace) acids and roccellic acid (by TLC).

Etymology: The specific epithet is derived from the Tasmanian aboriginal word ‘toilena’ meaning ‘stringy bark’ (Plomley 1976); this refers to *Eucalyptus obliqua* L’Hérit., the tree which is the most common host for this lichen.

Observations: The new species is characterized morphologically by the green to greenish grey, powdery, non-lobed thallus and chemically by the production of roccellic acid and an unusual combination of depsidones that includes malonprotocetraric acid (not known previously from *Lepraria*) and fumarprotocetraric acid as major substances. This combination of characters is unique in the genus *Lepraria*. Only two *Lepraria* taxa, *L. caesioalba* (de Lesd.) J.R.Laundon (chemotype I) and *L. nivalis* J.R.Laundon (chemotypes I–III) are known to produce fumarprotocetraric and/or protocetraric acids (usually accompanied by atranorin), but neither of these contains malonprotocetraric acid (Laundon 1992; Leuckert *et al.* 1995, 2004). In addition, these species differ morphologically: *L. caesioalba* has a granular, grey thallus, whereas the thallus of *L. nivalis* is white to pale grey and sublobed, and the soredia usually possess projecting hyphae (Laundon 1992). Morphologically *L. toilena* is quite similar to *L. atlantica* Orange, *L. jackii* Tønsberg and *L. toensbergiana* Bayerová & Kukwa. However, these all have a different chemistry that can be demonstrated easily by TLC: all of them contain atranorin and fatty acids, with additional porphyritic acid in *L. atlantica* (Kümmerling *et al.* 1995; Orange 2001; Bayerová *et al.* 2005). None of the five taxa mentioned above has been reported from Tasmania, and only *L. caesioalba* and *L. jackii* are known from the Southern Hemisphere (Laundon 1992; Kümmerling *et al.* 1995; Aptroot *et al.* 1997; Orange 2001; Leuckert *et al.* 2004; Bayerová *et al.* 2005).

In the Tasmanian flora, *Lepraria toilena* can be identified with certainty only by chemical means. There is one additional, unidentified species that contains fumarprotocetraric acid and related substances, but this also contains atranorin. Likewise, fatty acids are known in several unidentified taxa, but these occur either alone or together with atranorin. All the material concerned requires further study. The lichen most easily confused with the new species is *Cladia schizopora* (Nyl.) Nyl. Extreme forms of the *Cladia* lack the typical, perforate pseudopodetia and form a sterile, sorediate, *Lepraria*-like crust. Whereas both taxa contain protocetraric and fumarprotocetraric acids, *Lepraria toilena* differs chemically by containing additional

malonprotocetrariac acid and roccellic acid, the latter albeit in trace amounts. The two taxa differ morphologically by the *Lepraria* having a whitish, \pm byssoid hypothallus covered in coarse soredia. The hypothallus is clearly visible through the layer of soredia and at the thallus margins.

Ecology and distribution: *Lepraria toilenae* is currently known from several widely scattered localities, but it is likely to be more widespread but overlooked elsewhere because the genus as a whole has never been the focus of a specific scientific study in Tasmania. The new species occurs on bark and has been recorded from wet eucalypt forest and cool temperate rainforest. It is particularly common at the type locality where it is a constant epiphyte on very large (sometimes greater than 250 cm dbh), very tall (to 65 m) *Eucalyptus obliqua* trees (family Myrtaceae). There it forms extensive colonies up to 50 cm across or more on the dry, sheltered sides of the lower trunk and buttress. The bark in such habitats is thick, fibrous and often lightly charred from past wildfires. Other trees that are known to support the new lichen include *Nothofagus cunninghamii* (Hook.) Oersted (Fagaceae) and the long-lived conifer *Lagarostrobos franklinii* (Hook.f.) Quinn (Podocarpaceae). These trees tend to have flaky bark that forms plates.

The apparent restriction of *Lepraria toilenae* to the dry bark of very large trees in wet forest is rather unusual within the Tasmanian *Lepraria* flora. All of the other better-known, named Tasmanian species tend to have rather broad ecological amplitudes, occurring on bark, wood or soil, and in a wide range of vegetation types.

The type locality of *Lepraria toilenae* is a commercial forest that is being harvested for timber and is the subject of a detailed, ongoing study of lichens and bryophytes (Jarman & Kantvilas 2001 a, b). During this work, the status of the new species was overlooked due to its superficial resemblance to heavily sorediate forms of *Cladia schizopora* (see above). Other species associated with *Lepraria toilenae* include *Micarea micrococca* (Körber) H. Gams, *Placynthiella icmalea* (Ach.) Coppins & P. James, *Hypocenomyce foveata* Timdal, *Chaenotheca hygrophila* Tibell and species of *Chaenothecopsis* Vain. (Kantvilas & Jarman 2004).

Selected specimens examined (total = 14): **TASMANIA:** c. 3 km S of Teepookana, 42°13'S 145°26'E, 220 m altitude, 7 Nov. 1990, G. Kantvilas 626/90 (HO); W of Savage River Pipeline Road, Coupe RD 22A, 41°13'S 145°19'E, 450 m altitude, 25 Nov. 2003, G. Kantvilas 666/03 (HO); Weindorfers Forest, 41°38'S 145°56'E, 920 m altitude, 30 Mar. 1988, G. Kantvilas s.n. (HO); W of Tahune Bridge in the Warra SST, Big Coupe, 43°06'S 146°41'E, 180 m altitude, 25 Jan. 2000, G. Kantvilas 69/00 (HO, UGDA); same locality, Middle Coupe CFI plot, 43°06'S 146°41'E, 130 m altitude, 17 Jul. 1998, G. Kantvilas s.n. (HO, UGDA); Warra Creek, site S18, 43°05'S 146°43'E, 250 m altitude, 19 Jun. 1996, G. Kantvilas s.n. (HO); Boyd Lookout, 42°49'S 146°22'E, 550 m altitude, 24 Nov. 1981, G. Kantvilas s.n. (HO); Bluff River Gorge, 42°31'S 147°40'E, 200 m altitude, 30 May 2005, G. Kantvilas 135/05 (HO); Walls of Jerusalem walking track carpark, 41°47'S 146°14'E, 730 m altitude, 14 Aug. 2005, G. Kantvilas 245/05 (HO).

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