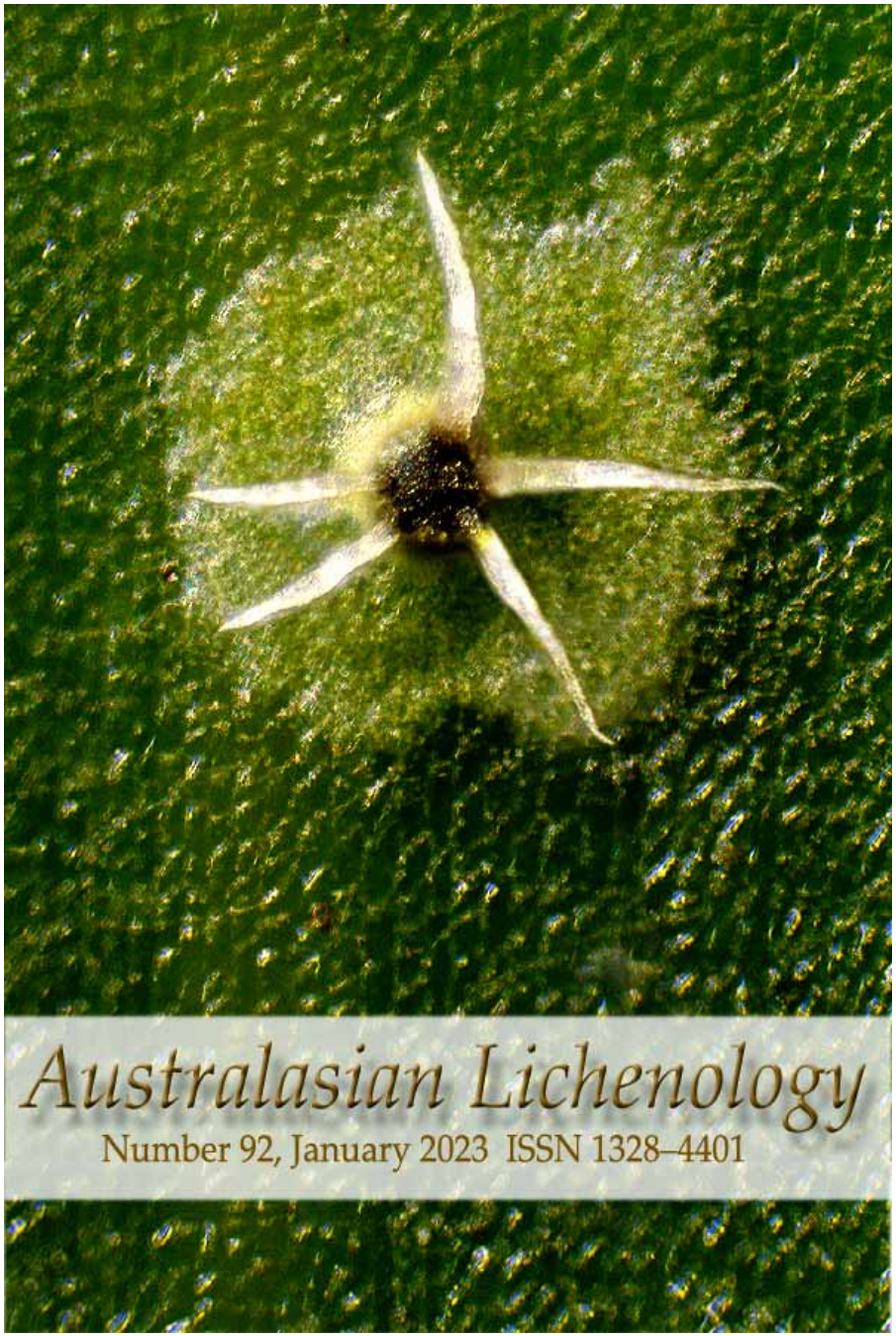


Australasian Lichenology
Number 92, January 2023 ISSN 1328–4401

Trichothelium assurgens is small even for an epiphyllous foliicole. Its perithecia typically measure a mere 0.1–0.15 mm in diameter. They'd be all but invisible without their (2–)3–6(–8), long, whitish setae. The species colonizes the living leaves of ferns and sundry other understorey forest plants. It's known from Queensland, New South Wales, Victoria, and Tasmania in Australia, plus the Cook Islands, New Zealand, the northern Mariana Islands, Solomon Islands, Hawai'i and Japan.

0.1 mm

CONTENTS

The remarkable *Lecidea hypersporella* Stirt.

Gintaras Kantvilas
Tasmanian Herbarium, Tasmanian Museum and Art Gallery,
P.O. 5058, UTAS LPO, Sandy Bay, Tasmania 7005, Australia
e-mail: Gintaras.Kantvilas@tmag.tas.gov.au

Abstract

Lecidea hypersporella Stirt., based on a type specimen from Tasmania, is described, illustrated and discussed. Known only from the original material, the taxonomic affinities of this species remain unknown. It is characterized by biatorine apothecia, polyspored asci approximating the *Porpidia*-type and simple, hyaline ascospores.

Introduction

Lecidea has traditionally been a place-holder or "form" genus for crustose lichens with a green photobiont, apothecioid ascomata that lack a thalline margin, and simple, hyaline ascospores. This concept became entrenched in the early 20th Century with the work of the Austrian lichenologist Alexander Zahlbruckner, but in the last 40–50 years the genus has been divided repeatedly into natural units. Initially, this was based on morphological and anatomical criteria, culminating in the seminal work of Hafellner (1984), which consolidated and brought into general use the application of ascus structure in lichen classification. More recently, molecular data have been applied to better understand and segregate the various, often unrelated genera (and families) that had been subsumed within Zahlbruckner's old concept. The process has seen the resurrection of numerous genera that had fallen into disuse (e.g. *Lecidella* Körb., *Porpidia* Körb. and *Trapelia* M.Choisy) and the erection of many new ones. Good examples of the latter in the Australian flora include *Australidea* (Kantvilas *et al.* 2021), *Hertelidea* (Printzen & Kantvilas 2004), *Lambiella* (Hertel 1984), *Malcolmiella* (Vězda 1997) and *Ramboldia* (Kantvilas & Elix 1994), all of which are based on species originally described in *Lecidea*. However, many taxa remain to be studied, and many of the names currently listed under *Lecidea* in the Australian lichen checklist (McCarthy 2020) will eventually be placed elsewhere.

In the course of locating old Australian "*Lecidea*" type specimens, essentially scattered through some of Europe's largest herbaria, such as London's Natural History Museum (BM), the Conservatoire & Jardin botaniques de la Ville de Genève (G), the Glasgow Museum (GLAM) and the Finnish Museum of Natural History (H), and attempting to match them to recent collections, one especially enigmatic species was examined. *Lecidea hypersporella* was described by the Scottish lichenologist James Stirton from a specimen collected in Tasmania in the 1870s by Hugh Paton. Stirton made significant contributions to lichenology in Australia and New Zealand (Stirton 1876, 1882, 1898, 1900), relying mainly on specimens sent to him by resident collectors. Paton was a traveller and whilst little is known of him, he provided Stirton with several Tasmanian specimens that were subsequently described as new taxa, some with names still in use today, for example *Buellia dissa* (Stirt.) Zahlbr., *Lecanora subtecta* (Stirt.) Kantvilas & LaGreca and *Ramboldia subnexa* (Stirt.) Kantvilas & Elix.

Placing old names in a modern context ideally requires additional, more recent collections. However, *L. hypersporella* remains elusive, and despite extensive lichenological collecting in Tasmania over the last 40 years or so, it is still known only from the type collection. To draw the attention of lichenologists to this remarkable species and its unusual combination of salient characters, a description is presented here, with the hope that others may be able to shed light on its affinities and, ideally, obtain more material for further study.

Material and methods

The study is based on an isotype collection from London's Natural History Museum (BM) (Fig. 1). Investigations were undertaken on hand-cut sections of the thallus and apothecia, using standard methods, reagents and stains: water, 10% KOH (K), Lactophenol Cotton Blue

and Lugol's Iodine (I). Measurements of ascospores are presented in the format 5th percentile–*average*–95th percentile, with outlying values in brackets and *n* the number of observations.

Description

Lecidea hypersporella Stirt.
Trans. Glasgow Soc. Field Nats. **4**, 94 (1876). *Type*: "ad ligna decorticata in Tasmania", [*H. Paton*, 1870s] (holo—GLAM; iso—BM!).

Thallus crustose, effuse, whitish, ecorticate, 25–40 µm thick; photobiont a unicellular green alga with globose cells 5–10 µm diam., densely packed together; medulla KI–. *Apothecia* biatorine, immarginate, roundish, scattered, adnate, 0.6–1 mm diam.; disc black, somewhat glossy, epruinose, slightly to markedly convex; proper exciple in section hyaline within, annular, 40–80 µm thick, composed of a loose network of radiating, branched hyphae *c.* 2 µm thick in a gel matrix. *Hypothecium* opaque brown, unchanged in K, 150–180 µm thick in the widest, central part, tapering towards the edges. *Hymenium* 75–80 µm thick, hyaline, K+ blue, KI+ intense blue, not inspersed, remaining conglutinated in K, overlain by a diffuse, rather discontinuous brownish epithecium that dissolves in K. *Asci* narrowly cylindrical-clavate, (16–) 24–32-spored, 55–75 × 12–20 µm, with an amyloid outer wall, a thickened, amyloid tholus with an intensely amyloid ring, and lacking an ocular chamber (approximating the *Porpidia*-type). *Paraphyses* slender, sparsely branched, wavy, loosely entangled, non-capitate, 1–1.5 µm thick. *Ascospores* hyaline, simple, non-halonate, thin-walled, ellipsoid, 7.5–*8.9*–10 × 4–*4.6*–5(–6) µm (*n* = 60) (Fig. 2). *Conidiomata* not found.
Chemistry: not tested.

Discussion

The BM isotype specimen examined is a small scrap of bark with a few well-formed apothecia (Fig. 1). Although Filson (1988) also cited a specimen in GLAM, it could not be located using on-line resources such as the GLAM *Collections Navigator* and JSTOR. The substratum of the specimen is a partially rotted piece of decorticated wood. Its general form is consistent with it being eucalypt and, interestingly, Paton collected several other lichens from eucalypt wood, notably *Ramboldia stuartii* (Hampe) Kantvilas & Elix (described as *Lecidea lampra* Stirt.) and *Micarea intersociella* (Stirt.) Coppins (described as *Lecidea aniptiza* f. *intersociella* Stirt.). These lichens were the focus of recent studies in Tasmania (Kantvilas & Elix 1993, 2007; Kantvilas & Coppins 2019), yet no *Lecidea hypersporella* was seen. If these species are indeed all from the same or similar locations, then *L. hypersorella* is clearly rare. There are several examples of mixed-up herbarium specimen labels leading to the attributing of the incorrect provenance to some Tasmanian species (see Kantvilas & Coppins 1997), but no Stirton specimens have ever been suspected of this.

I have been unable to find a suitable generic placement for this species. *Porpidia*-type asci occur widely, but mainly in saxicolous lichens (e.g. *Paraporpidia*, *Poeltiaria*, *Porpidia*, *Xenolecia*; see Fryday & Hertel 2014). Non-saxicolous genera with *Porpidia*-type asci include the recently described *Australidea*, which is epiphytic (Kantvilas *et al.* 2021), and the bryicolous/terricolous *Bryobilimbia* (Fryday *et al.* 2014); neither shows any morphological and anatomical affinities to *Lecidea hypersporella*. Polyspored asci can characterize a genus, for example *Maronea* and *Biatorella*, but in such genera, the asci contain many more than 32 spores, and often up to 100 or more. Alternatively, some genera, such as *Candelariella* and *Protoparmelia s. lat.,* can include 8-spored and polyspored species. However, I have been unable to find a named genus that is corticolous *and* polyspored *and* with *Porpidia*-type asci. In that respect, whether or not the specimen is indeed from Tasmania, or is the result of some mix-up of labels, is a moot point and does not diminish its interest. Collection and study of such lignicolous lichens continues when the opportunity arises, in the hope of finding fresh material that can be used for DNA sequencing. Until such time, *Lecidea hypersporella* remains a mystery.

Acknowledgement
The patient loan of type material from the Natural History Museum, London, is greatly appreciated. Jean Jarman prepared the figures for publication.

References

Filson, RB (1986): *Index to the Type Specimens of Australian Lichens*: *1800–1984*. Australian Flora and Fauna Series Number 4. Australian Government Publishing Service, Canberra.
Fryday, AM; Hertel, H (2014): A contribution to the family Lecideaceae s. lat. (Lecanoromycetidae inc. sed., lichenized Ascomycota) in the southern subpolar region; including eight new species and some revised generic circumscriptions. *Lichenologist* **46**, 389–412.
Fryday, AM; Printzen, C; Ekman, S (2014): *Bryobilimbia*, a new generic name for *Lecidea hypnorum* and closely related species. *Lichenologist* **46**, 25–37.
Hafellner, J (1984): Studien in Richtung einer natürlicheren Gliederung der Sammelfamilien Lecanoraceae und Lecideaceae. *Beiheft zur Nova Hedwigia* **79**, 241–371.
Hertel, H (1984): Über saxicole, lecideoide Flechten der Subantarktis. *Beiheft zur Nova Hedwigia* **79**, 399–500.
Kantvilas, G; Coppins, BJ (1997): *Melaspilea circumserpens* Nyl. rediscovered and referred to *Glonium*; with discusssion on the provenance of some of Robert Brown's lichen specimens. *Lichenologist* **29**, 525–531.
Kantvilas, G; Coppins, BJ (2019): Studies on *Micarea* in Australasia II. A synopsis of the genus in Tasmania, with descriptions of ten new species. *Lichenologist* **51**, 431–481.
Kantvilas, G; Elix, JA (1994): *Ramboldia*, a new genus in the lichen family Lecanoraceae. *Bryologist* **97**, 296–304.
Kantvilas, G; Elix, JA (2007): The genus *Ramboldia* (Lecanoraceae): a new species, key and notes. *Lichenologist* **38**, 135–141.
Kantvilas, G; Wedin, M; Svensson, M (2021): *Australidea* (Malmideaceae, Lecanorales), a new genus of lecideoid lichens, with notes on the genus *Malcolmiella. Lichenologist* **53**, 395–407.
McCarthy, PM (2020): *Checklist of the Lichens of Australia and its Island Territories.* Australian Biological Resources Study, Canberra. Version 1 March 2020. http://www.anbg.gov.au/abrs/lichenlist/introduction.html
Printzen, C; Kantvilas, G (2004): *Hertelidea*, genus novum Stereocaulacearum (Ascomycetes lichenisati). *Bibliotheca Lichenologica* **88**, 539–553.
Stirton, J (1876): Lichens British and foreign. *Transactions of the Glasgow Society of Field Naturalists* **4**, 85–95.
Stirton, J (1882): Notes on the genus *Usnea*, with descriptions of new species. *Scottish Naturalist* **6**, 292–297.
Stirton, J (1898): On new Australian and New Zealand lichens. *Transactions and Proceedings of the New Zealand Institute* **30**, 382–393.
Stirton, J (1900): On new lichens from Australia and New Zealand. *Transactions and Proceedings of the New Zealand Institute* **32**, 70–82.
Vězda, A (1997): *Lichenes Rariores Exsiccati* **27**, 1–7.

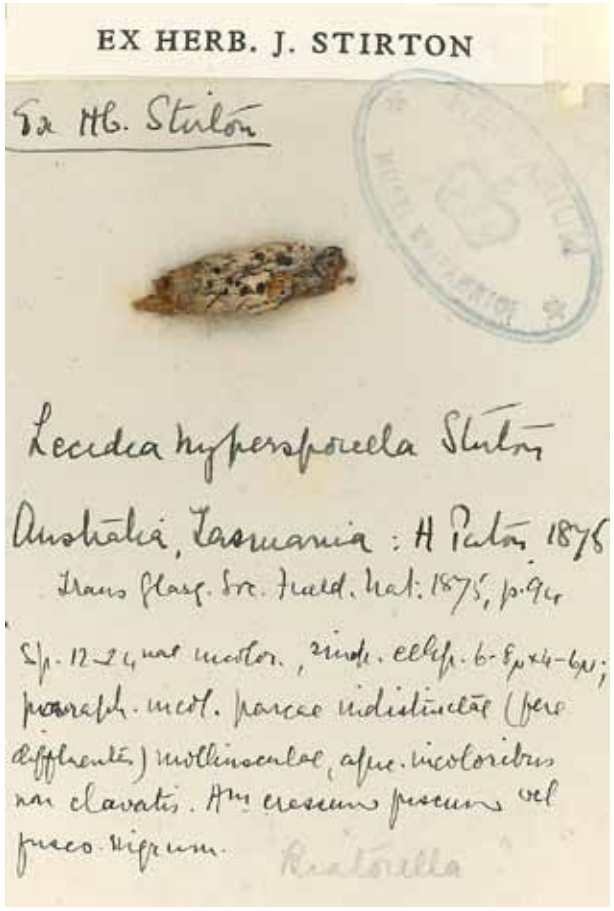


Figure 1. Isotype specimen of *Lecidea hypersporella* (BM).

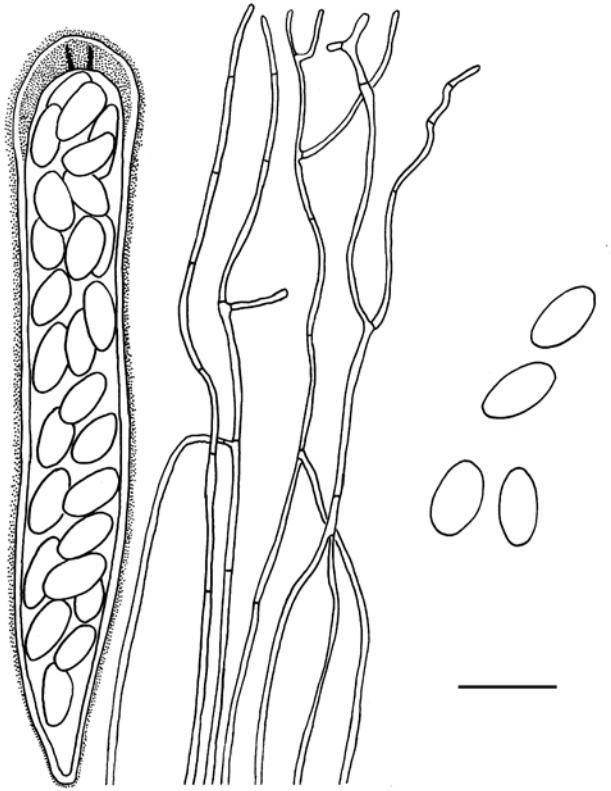


Figure 2. Asci, paraphyses and ascospores of *Lecidea hypersporella*, with amyloid parts stippled. Scale = 10 µm.

Reinstatement of *Usnea capillacea* Motyka (lichenized Ascomycota, Parmeliaceae) to the New Zealand lichenized mycobiota

Jennifer M. Bannister
Department of Botany, University of Otago,
P.O. Box 56, Dunedin 9054, New Zealand
e-mail: jenniferbannister7@gmail.com

Allison Knight
Department of Botany, University of Otago,
P.O. Box 56, Dunedin 9054, New Zealand
e-mail: allison.knight.nz@gmail.com

Dan Blanchon
School of Environmental and Animal Sciences, Unitec Institute of Technology-Te Pūkenga, Private Bag 92025, Auckland, New Zealand
e-mail: dblanchon@unitec.ac.nz

Abstract

The taxonomic histories of *Usnea capillacea* Motyka and *U. articulata* (L.) Hoffm. (Parmeliaceae) in New Zealand are discussed. Habitat preferences and molecular and morphological differences between the two species support reinstating *Usnea capillacea* to the New Zealand lichenized mycobiota for specimens currently referred to *U. articulata.*

Introduction

Usnea capillacea Motyka, a characteristic mist forest lichen species of New Zealand (Galloway 1985), was synonymized with the widespread and cosmopolitan *U. articulata* (L.) Hoffm. by Stevens (1999). That decision was maintained by Stevens for Australia (Stevens 2004), and followed by Galloway (2007) for New Zealand.

The type material of *U. articulata* was collected in Burnley, England, 54°47’27”N, 02°14’25”W, (OXF-lectotype), and that of *U. capillacea* at Saddle Hill, Otago, New Zealand, 45°54’54”S, 170°21’00”E (Herbarium Motyka – holotype, CHR 343971! –lectotype). A comparison of DNA sequence data of specimens identified as *U. articulata* from the United Kingdom and New Zealand by Rafat (2014) and Rafat *et al*. (2015) did not find a close match. In addition, the descriptions of *U. articulata* from the United Kingdom (Smith *et al*. 2009) and that of *U. capillacea* from New Zealand (Galloway 1985) are significantly different, prompting us to reassess Stevens’ 1999 synonymizing of *U. capillacea*. This paper presents a comparison of the morphology, ecology and available molecular data (ITS rDNA) of New Zealand material currently identified as *U. articulata* with information relevant to that species in the United Kingdom.

Methods

A comparison of the two species is provided using *Flora of New Zealand Lichens* (Galloway 1985) and *The Lichens of Great Britain and Ireland* (James *et al.* 2009), as well as material from New Zealand. Thin-layer chromatography was carried out using the methods of Culberson (1972) and White & James (1985), using Solvent C.

Results

Morphology:

(1) *Usnea articulata* is pendent or scrambling over low vegetation, reaching over 1 metre in length, whereas *U. capillacea* is pendent but never scrambling, reaching up to only 40 cm in length. (2) The main branches of *U. articulata* can reach 3 mm in width, whereas *U. capillacea* (Fig. 1) has narrower branches up to only 0.7 mm in width (Fig. 2). (3) The older branches of *U. articulata* are strongly inflated with sausage-shaped segments (Figs 1, 3) *Usnea capillacea* can be jointed in part, but is never inflated to that extent (Fig. 2). (4) The cortex of *U. articulata* can have white, comma-shaped pseudocyphellae (Figs 1, 3) which have never been seen in *U. capillacea.* (5) Apothecia are unknown in *U. articulata*, but they are not rare in *U. capillacea* (Fig. 4).

Chemistry:

The chemistry of *Usnea articulata* has been reported as having fumarprotocetraric acid in both British (James *et al.* 2009) and New Zealand (Galloway 1985) populations. The chemistry of *U. capillacea* (as *U. articulata*) also includes fumarprotocetraric acid. The isotype of *U. capillacea* contains fumarprotocetraric, succinoprotocetraric, protocetraric, confumarprotocetraric, conprotocetraric and usnic acids. Recent TLC results for New Zealand specimens usually show varying amounts of protocetraric acid.

Habitat:

Usnea articulata lives in well-lit, xeric conditions, often on lowland deciduous trees (Fig. 5), whereas *U. capillacea* is a mist forest species growing on trees and shrubs from low altitude up to 1200 m (Fig. 6).

Distribution:

Usnea articulata is a cosmopolitan, mainly Northern Hemisphere species (Stevens 1999), whereas *U. capillacea* is a common and distinctive New Zealand lichen, mainly in the South Island but extending further south to Auckland Island.

Molecular data:

Rafat (2014) found that three specimens from New Zealand morphologically identified as *U. articulata* did not form a clade in a rDNA phylogenetic tree with a sequence from a specimen of *U. articulata* from Britain (where the lectotype of the species was collected) (Genbank ID FR799033). Rafat *et al*. (2015) found that the ITS rDNA sequence of a New Zealand specimen of *U. articulata* was not a close match for any sequences of *Usnea* species in Genbank (the closest matches were *U. sphacelata* R.Br. and *U. trachycarpa* (Stirt.) Müll.Arg. at 95%). A BLAST search of their sequence (Genbank ID JX144646), does not show a close similarity to European sequences of *U. articulata*.

Conclusion

Based on the considerable differences in habit, morphology and DNA sequence data outlined above, as well as in distribution and habitat preference, the name *Usnea capillacea* is reinstated in the New Zealand mycobiota for specimens currently referred to *U. articulata*.

SELECTED SPECIMENS EXAMINED

North Island: Wanganui-Manawatu: ● Ohakune, 39°24’24”S, 175°25’01”E, 600 m alt., *L. Ludwig*, 23.xi.2013 (OTA 72035). *South Island*: Tasman: ● Red Hills, 41°43/03”S, 172°00’25”E, 1129 m alt., on *Dracophyllum*, *T. Aldridge*, 22.x.2020 (OTA 73054); ● Moa Park, 40°56”06”S, 172°56’29”E, 1008 m alt., on *Leptospermum*, *A. Knight*, 23.x.2019, (OTA 72045); ● Mt Owen, 41°31’24”S, 172°33’40”E, 1209 m alt., on *Dracophyllum*, *T. Aldridge*, 3.xii.2020, (OTA 73126); Canterbury: ● Nina Valley, 42°25’32”S, 172°19’23”E, 758 m alt., on *Nothofagus*, *T. Aldridge*, 23.ix.2020 (OTA 73067); Southland: ● Borland Saddle Road, 45°26’42”S, 167°17’34”E, 392 m alt., on *Nothofagus*, *A. Knight*, 8.i.2020 (OTA 72405); Southland: ● Lake Te Anau, south-west arm, 45°08’24”S, 167°30’18”, 158 m alt., on *Nothofagus*, *P. Gillette*, 17.x.2018 (OTA 71236); Otago: ● Rankelburn Forest, Blue Mountains, 45°57’31”S, 169°20’44”E, 550 m alt., on *Nothofagus*, *P. Gillette*, 23.viii.2018 (OTA 71181). *Auckland Island*: ● Ranui Cove, 50°32’25”S, 166°16’35”E, 5 m alt., *A. Knight*, 1.viii.2018 (OTA 71437).

Acknowledgments

We thank Sandy Coppins, Secretary (Communications) of the British Lichen Society, for helpful information and for photographing Figures 1, 3 and 5, Peter de Lange for commenting on the manuscript, and the University of Otago Botany Department for its support.

References

Culberson, CF (1972): Improved conditions and new data for the identification of lichen products by a standardized thin-layer chromatographic method. *Journal of Chromatography* **72**, 113–125.

Galloway, DJ (1985): *Flora of New Zealand Lichens*. P.D. Hasselberg, Government Printer, Wellington.

Galloway, DJ (2007): *Flora of New Zealand Lichens*. 2nd edition. Manaaki Whenua Press, Lincoln.

James, PW; Clerc, P; Purvis, OW (2009): *Usnea* Adans. (1763), In: Smith, CW; Aptroot, A; Coppins, BJ; Fletcher, A; Gilbert, OL; James, PW; Wolseley, PA (eds), *The Lichens of Great Britain and Ireland*. Pp. 918–929. British Lichen Society, London.

Rafat, A (2014): *Ecological and Biological Studies of New Zealand Lichens in the Genus* Usnea. Ph.D. Thesis, Lincoln University, Lincoln.

Rafat, A; Ridgway, HJ; Cruickshank, RH; Buckley, HL (2015): Isolation and co-culturing of symbionts in the genus *Usnea*. *Symbiosis* **66**, 123–132.

Stevens, GN (1999): A revision of the lichen family Usneaceae in Australia. *Bibliotheca Lichenologica* **72**, 1–128.

Stevens, GN (2004): Usneaceae. *Flora of Australia* **56A**, 78–115.

White, FJ; James, PW (1985): A new guide to microchemical techniques for the identification of lichen substances. *British Lichen Society Bulletin* **57** (suppl.), 1–40.

Fig. 1. Detail of Northern Hemisphere *Usnea articulata*, showing inflated, sausage-shaped branches with pseudocyphellae. On hawthorn, Grey Park Wood, Devon, UK.

Fig. 2. Detail of *Usnea capillacea* showing fine, capillary–like branches.

Fig. 3. Habit of *Usnea articulata.* On oak, Wistmans Wood, Devon, UK.

Fig. 4. Fertile *Usnea capillacea* with multiple apothecia, Lake Monowai.

Fig. 5. Lowland deciduous habitat *of Usnea articulata.* On oak, Wistmans Wood, Devon, UK.

Fig. 6. Subalpine evergreen mist forest habitat *of Usnea capillacea* Hump Ridge, Southland.

Fellhanera fasciculifera (Pilocarpaceae), a new saxicolous lichen from southern New South Wales, with a key to the genus in Australia

Patrick M. McCarthy
64 Broadsmith St, Scullin, A.C.T. 2614, Australia
e-mail: pmcc2614@hotmail.com

Abstract
Fellhanera fasciculifera sp. nov. (lichenized Ascomycota, Pilocarpaceae) is described from sandstone in southern New South Wales, Australia. It has a rather thick, brownish thallus composed of goniocysts, small, ± sessile apothecia with blackish, convex discs, a slightly paler proper margin, a thick, pale and cupulate proper excipulum, a reddish brown to dark brown hypothecium, and small 3-septate ascospores. A key is provided to the 17 species of *Fellhanera* known from Australia.

Introduction
While the predominantly foliicolous genus *Fellhanera* Vězda (Pilocarpaceae) is most diverse in the tropics and subtropics, in recent years, several corticolous and saxicolous taxa have been described from tropical and temperate regions of Australia (Elix 2008; Elix & McCarthy 2017; McCarthy & Elix 2017, 2019). In this contribution, a new saxicolous species is reported from sandstone in southern New South Wales, and a key is provided to the 17 taxa currently known from Australia.

Fellhanera fasciculifera P.M.McCarthy, sp. nov. Figs 1, 2
MycoBank No.: **MB 845972**

Thallus consisting entirely of goniocysts, 0.1–0.35 mm thick, continuous to rimose, dull pale brown, lacking lichen substances. Apothecia biatorine, sessile, 0.24–0.72 mm diam., with a dull blackish, convex disc and a slightly paler proper margin; proper excipulum cupulate, uniformly pale in section, paraplectenchymatous, K+ pale lilac-grey laterally; hypothecium and epihymenium dark brown to blackish; asci *Byssoloma*-type; ascospores 3-septate, narrowly ellipsoid to oblong-ellipsoid, oblong-fusiform or narrowly cylindrical, 11–18 × 2.5–5 µm.

Type: Australia. New South Wales, Southern Tablelands, 5 km SW of Bundanoon, Teudts Hill, 34°41'S, 150°16'E, 680 m alt., on sandstone in open eucalypt forest, *J.A. Elix 8980A*, 17.ix.1980 (holotype — CANB).

Thallus crustose, epilithic, dull pale brown, uneven, sparingly rimose, 0.1–0.25(–0.35) mm thick, ecorticate, composed entirely of globose, subglobose or broadly ellipsoid goniocysts that are 25–60(–90) µm in maximum extent. *Algae* green, globose, 8–15 µm diam., rather thick-walled; interstitial hyphae short-celled, 2–3 µm wide. *Thallus margin* thin, effuse; prothallus not apparent. *Apothecia* numerous, scattered, solitary or proliferating, subsessile to sessile and constricted at the base, biatorine, rounded to irregular, some with undulate or shallowly lobate margins, (0.24–)0.43(–0.72) mm diam. [*n* = 50]; proper margin initially ± concolorous with the thallus or a little darker, eventually only slightly paler than the disc, smooth, dull to slightly glossy, entire, 30–60 µm thick, not prominent, persistent or becoming excluded in old apothecia; disc dull grey-black or greenish black, smooth or coarsely uneven, plane to slightly or strongly convex, epruinose. *Proper excipulum* well-developed, cupulate, colourless to pale brown or pale orange-brown in thin section, occasionally somewhat darker near the hypothecium (all brownish pigments clearing in K), paraplectenchymatous, N–, K+ pale lilac-grey (Sedifolia-grey?) laterally adjacent to the hypothecium only, K– elsewhere, not containing K-soluble or calcium oxalate crystals (H_2SO_4–), 25–50(–60) µm thick laterally, 50–80(–90) µm thick at the base; cells thin-walled, rounded to isodiametric or somewhat angular, 5–9 × 3–7 µm; cells towards the marginal or basal edges more elongate, 6–10 × 3–4 µm. *Epihymenium* 10–15 µm thick, dark olive to blackish, colour clearing in K, N–. *Hypothecium* reddish brown to dark brown below, paler brown towards the hymenium, 60–90(–110) µm thick, not inspersed with granules or oil globules, ± paraplectenchymatous, K+ orange-brown to more intensely reddish brown, N–; basalmost cells periclinally elongate, thick-walled, 6–10 × 3–4 µm. *Hymenium* 60–90 µm thick, hyaline to pale greenish brown or with darker vertical streaks (these most obvious in older apothecia), not inspersed, KI+ blue. *Paraphyses* tightly conglutinate in water, loosening only slightly in K, 0.8–1.2(–1.5) µm wide, simple or sparingly branched and with sparse anastomoses (especially distally); apices usually slightly swollen and up to 2 µm thick, with thin, dark olive-brown, internal caps. *Asci* narrowly clavate or cylindroclavate, 45–57 × 8–13 µm [*n* = 12], 8-spored, *Byssoloma*-type, with or without a thin, amyloid, outer coat; tholus well-developed, amyloid, with an often conspicuous *masse axiale* bordered by a more intensely amyloid zone; ocular chamber shallow and convex or not apparent; most mature-sized asci lacking ascospores. *Ascospores* colourless, irregularly biseriate or obliquely massed in the ascus, 3-septate at maturity, narrowly ellipsoid to oblong-ellipsoid, oblong-fusiform or narrowly cylindrical, usually straight, often slightly constricted at the septa, (11–)14(–18) × (2.5–)4(–5) µm [*n* = 40], thin-walled, lacking a perispore at maturity, the ends rounded or subacute; contents clear. *Pycnidia* absent.
Chemistry: No lichen substances detected by TLC (*fide* G.Kantvilas).

Etymology: From the Latin *fasciculus* (a small bundle) and the suffix *-fera* (-bearing), in reference to the minute, thalline goniocysts containing clusters of photobiont cells.

Remarks
One of only a handful of non-foliicolous *Fellhanera* species with 3-septate spores, the new lichen is further characterized by its well-developed thallus composed of goniocysts, blackish convex apothecia, a rather thick and pale, cupulate proper exciple that is laterally K+ pale lilac-grey, and short, narrow, 3-septate ascospores. In contrast, the mainly saxicolous *F. granulosa* R.C.Harris & Lendemer, from eastern U.S.A., also has 3-septate ascospores of similar dimensions, but the thallus is blastidiate, the more-or-less concolorous apothecial margin is K– in section and the hypothecium is K+ purple and N+ orange-red (Harris & Lendemer 2009).
Fellhanera fasciculifera is known only from the type locality in southern New South Wales, where it grows on siliceous rock in open eucalypt forest.

Key to *Fellhanera* in Australia

[Based on Santesson (1952); Vězda & Hafellner (1991); Vězda & Kalb (1991); Kalb & Vězda (1994); Sérusiaux (1996); Lücking *et al.* (2001a, b); Elix (2008); Lücking (2008); Elix & McCarthy (2017); McCarthy & Elix (2017, 2019); for publication details, synonymy and distribution, see McCarthy (2020)]

1 Mature ascospores persistently 1-septate 2
1: Mature ascospores with 3 or more transverse septa..... 6

2 Apothecia pale brown or shades of yellow or orange, 0.1–0.4 mm wide; excipulum base 30–60 µm thick, lacking crystals of calcium oxalate 3
2: Apothecia white or creamy white, 0.4–1.5(–2.5) mm wide; excipulum base 60–130 µm thick, containing abundant calcium oxalate..... 5

3 Thallus smooth, in small, rounded patches to 15 mm wide; excipulum base brown .....
.....***F. semecarpi***
3: Thallus granulose or farinose, often forming extensive colonies; excipulum base colourless or pale yelliow 4

4 Thallus pale bluish grey or bluish green, containing usnic and isousnic acids; ascospores 10–17 × 3–6 µm; usually on leaves, occasionally on bark or rock ..... ***F. bouteillei***
4: Thallus pale greenish grey, not bluish; chemistry not known; ascospores 8–11(–14) × 2–3 µm; only on leaves ..... ***F. parvula***

5 Thallus corticolous, verruculose, to 0.12 mm thick, containing atranorin and thuringione; ascospores 11–18 µm long; conidia 2.5–3.5 × 2–2.5 µm ..... ***F. incolorata***
5: Thallus saxicolous, verrucose, bullate or cerebriform, to 1.5(–2.5) mm thick, containing atranorin and norgangaleoidin; ascospores 8–15 µm long; conidia 1.5–2.5 µm diam ..... ***F. robusta***

6 Thallus growing on rock, wood or bark. 7
6: Thallus growing on leaves..... 9

7 Apothecial disc flesh-coloured to pale tan at first, becoming brown or dark brown; thallus containing 4,5-dichlorolichexanthone (major) and zeorin (major); ascospores 3–5-septate ..... ***F. tropica***
7: Apothecial disc dull brownish to grey-black or greenish black; thallus lacking lichen substances; ascospores (1–)3-septate or persistently 3-septate 8

8 Thallus to 0.08 mm thick, faintly rugulose-verruculose, not composed of goniocysts; ascospores (1–)3-septate, 4.5–7.5 µm wide; proper excipulum laterally K– ..... ***F. pluviosilvestris***
8: Thallus 0.1–0.25(–0.35) mm thick, composed of goniocysts; ascospores 3-septate, 2.5–5 µm wide; proper excipulum laterally K+ pale lilac-grey ..... ***F. fasciculifera***

9 Thallus with scattered or confluent soralia; proper excipulum encrusted with K-soluble crystals 10
9: Thallus lacking soralia; proper excipulum usually not encrusted with crystals (except *F. mastothallina*, below) 11

10 Ascospores 3-septate; thallus with numerous, white, hemispherical verrucae 0.15–0.25 mm wide ..... ***F. stanhopeae***
10: Ascospores 3–5-septate; thallus lacking verrucae ..... ***F. tasmanica***

11 Ascospores predominantly 3-septate..... 12
11: Ascospores 5–7-septate..... 15

12 Thallus of isolated or confluent, convex, whitish verrucae 0.2–0.5 mm wide; apothecial disc dark brown, margin paler ..... ***F. bullata***
12: Thallus lacking verrucae..... 13

13 Thallus pale bluish grey; apothecial disc pale yellow to orange-yellow, with a white margin; ascospores 10–15 × 2.5–4.5 µm ..... ***F. subternella***
13: Thallus lacking a bluish tint; apothecial disc pale to dark brown, red-brown or blackish; margin pale grey to brown..... 14

14 Apothecia pale to dark brown or blackish; hypothecium dark brown, K–; apothecial base aeruginous to blackish brown; ascospores 12–18 µm long ..... ***F. rhapidophylli***
14: Apothecia pale red-brown; hypothecium purple-brown, K+ purple; apothecial base hyaline; ascospores 18–25 µm long..... ***F. endopurpurea***

15 Thallus with pale brown or orange-red verrucae; ascospores cylindrical, 22–34 × 3–4 µm ..... ***F. mastothallina***
15: Thallus not verrucose; ascospores ellipsoid or bacilliform, 18–24 × 3–4.5 µm..... 16

16 Apothecial disc red-brown; margin paler red-brown; ascospores ellipsoid, usually slightly curved and more pointed at the distal end ..... ***F. microdiscus***
16: Apothecial disc pale to dark brown; margin paler brown; ascospores bacilliform to narrowly ellipsoid, usually straight, not tapering towards one end ..... ***F. fuscatula***

Acknowledgement
I am grateful to Gintaras Kantvilas for chemical analysis (TLC) of the type specimen.

References
Elix, JA (2008): Four new lichens from tropical and subtropical Australia. *Australasian Lichenology* **62**, 35–39.
Elix, JA; McCarthy, PM (2017): Six new lichen species (Ascomycota) from Australia. *Telopea* **20**, 147–163.
Harris, RC; Lendemer, JC (2009): The *Fellhanera silicis* group in eastern North America. *Opuscula Philolichenum* **6**, 157–174.
Kalb, K; Vězda, A (1994): Beiträge zur Kenntnis der foliicolen Flechten australischer Regenwälder IV. *Bulletin de la Société linnéenne de Provence* **45**, 235–246.
Lücking, R (2008): Foliicolous lichenized fungi. *Flora Neotropica Monograph* **103**, 1–867.
Lücking, R; Streimann, H; Elix, JA (2001b): Further records of foliicolous lichens and lichenicolous fungi from Australasia, with an updated checklist for continental Australia. *Lichenologist* **33**, 195–210.
McCarthy, PM (2020): *Checklist of the Lichens of Australia and its Island Territories*. http://www.anbg.gov.au/abrs/lichenlist/introduction.html (Version 1 March, 2020). ABRS, Canberra.
McCarthy, PM; Elix, JA (2017): Five new lichen species (Ascomycota) and a new record from southern New South Wales, Australia. *Telopea* **20**, 335–353.
McCarthy, PM; Elix, JA (2019): A new saxicolous species of *Fellhanera* (lichenized Ascomycota, Pilocarpaceae) from eastern New South Wales, Australia. *Australasian Lichenology* **85**, 3–7.
Santesson, R (1952): Foliicolous lichens I. A revision of the taxonomy of the obligately foliicolous, lichenized fungi. *Symbolae Botanicae Upsalienses* **12**(1), 1–590.
Sérusiaux, E (1996): Foliicolous lichens from Madeira, with the description of a new genus and two new species and a world-wide key to foliicolous *Fellhanera*. *Lichenologist* **28**, 197–227.
Vězda, A; Hafellner, J (1991): Beiträge zur Kenntnis der foliikolen Flechten australischer Regenwälder II. *Nova Hedwigia* **52**, 73–80.
Vězda, A; Kalb, K (1991): Beiträge zur Kenntnis der foliikolen Flechten australischer Regenwälder III. *Nova Hedwigia* **53**, 215–228.

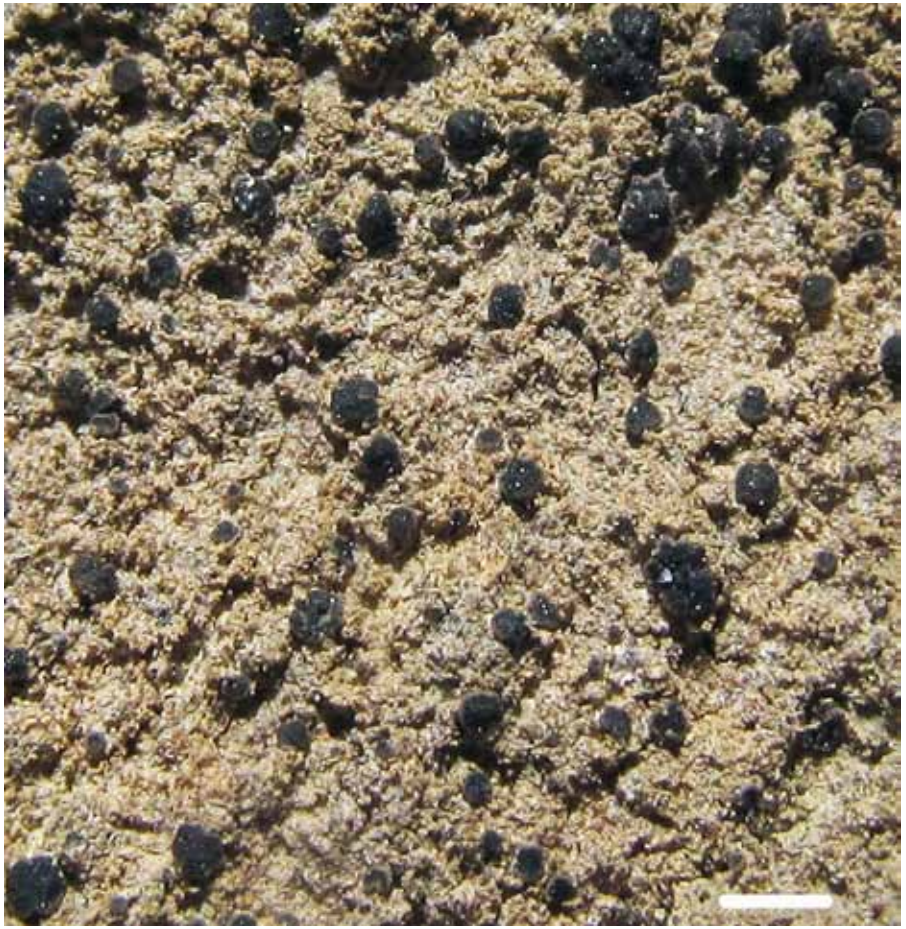


Figure 1. *Fellhanera fasciculifera* (holotype). Scale: 1 mm.

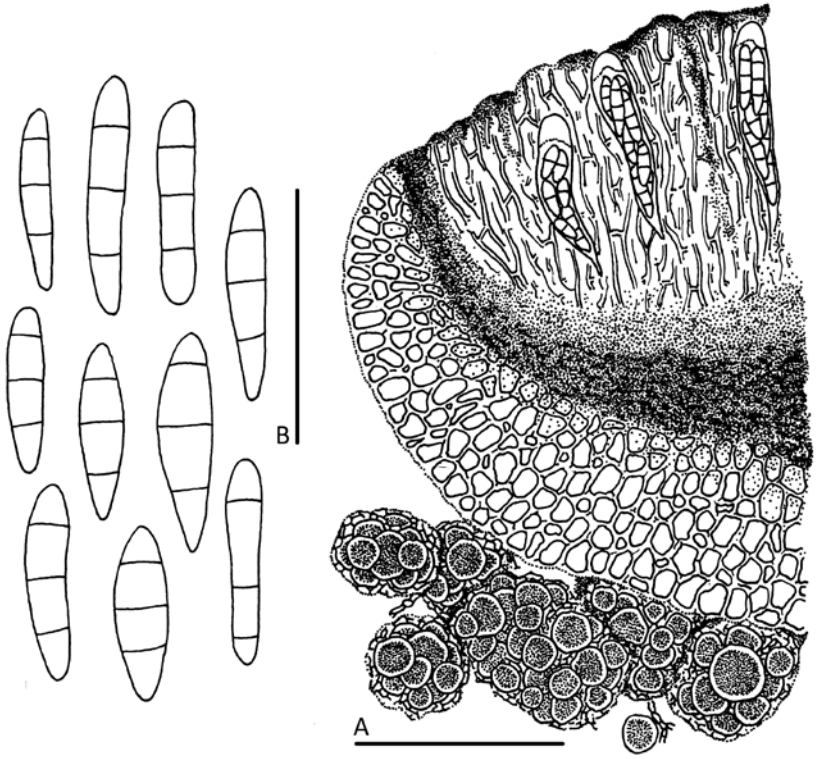


Figure 2. *Fellhanera fasciculifera* (holotype). A, Vertical section of an apothecial margin, the adjacent hymenium and some thalline goniocysts (semi-schematic); B, Ascospores. Scales: A = 50 µm; B = 20 µm.

Two new species, a new combination and keys to the species of buellioid lichens (Caliciaceae, Ascomycota) in Antarctica

John A. Elix
Research School of Chemistry, Building 137,
Australian National University, Canberra, A.C.T. 2601, Australia
e-mail: John.Elix@anu.edu.au

Abstract
Amandinea norconiops Elix and *Buellia tabarina* Elix are described as new to science from Graham Land, Antarctica. In addition, the new combination *Buellia cycloplaca* (I.M.Lamb) Elix is made for *Buellia russa* var. *cycloplaca* I.M.Lamb, and a key is provided to the 46 species of buellioid lichens known from Antarctica.

This paper continues my investigation of *Buellia*-like lichens in Antarctica, and follows from the previous accounts of *Buellia* and related genera (Elix 2018, 2019, 2021; Elix *et al.* 2020). Two new species are described, a new combination is made, and I provide a key to the 46 species of buellioid lichens currently known from Antarctica.

New species

1. Amandinea norconiops Elix, sp. nov. Fig. 1
MycoBank No. **MB 847042**

Similar to *Amandinea coniops* (Wahlenb.) M.Choisy ex Scheid. & H.Mayrhofer, but differs in having an inspersed subhymenium and in containing norstictic acid.

Type: Antarctica, Graham Land, Trinity Peninsula, Hope Bay, low hill on E side of bay, on loose stones, *I.M. Lamb s.n.* [Operation Tabarin no. 2406], 16.iv.1945 (holotype – BM 001231316).

Thallus crustose, to 40 mm wide and 1 mm thick, epilithic, areolate to bullate; areoles 0.5–1.2 mm wide, contiguous or separate, becoming elevated; upper surface pale grey-brown to brown, matt, cracked; prothallus marginal, black or not apparent; photobiont cells 10–17 µm wide; medulla K+ yellow then red, forming red needle-like crystals, lacking calcium oxalate (H_2SO_4–), I–. *Apothecia* 0.2–0.7 mm wide, abundant, lecideine, roundish, scattered, immersed then broadly adnate; disc black, epruinose, plane to weakly convex; proper exciple thick, persistent, in section 50–75 µm thick, outer part dark brown to brown-black, N+ deep red-brown, K–, inner part brown. *Epihymenium* 10–15 µm thick, olive-brown to brown-black, N+ weak red-brown or N–. *Hypothecium* 200–250 µm thick, dark brown to brown-black, K–. *Hymenium* 75–100 µm thick, colourless, with a few scattered oil droplets but not inspersed; subhymenium 40–50 µm thick, pale brown, inspersed with oil droplets; paraphyses 1–2.5 µm wide, sparingly branched, with apices 4–5 µm wide and brown caps. *Asci* 8-spored or with fewer spores (6), *Bacidia*-type. *Ascospores Physconia*- then *Buellia*-type, 1-septate, pale then dark brown, ellipsoid, 14–[*15.9*]–18 × 6–[*7.3*]–9 µm, becoming constricted at the septum with age, sometimes curved; outer wall rugulate to microrugulate. *Pycnidia* common, punctiform, superficial or emergent; ostiole black. *Conidia* curved, filiform, 23–30 × 0.7–1 µm.
Chemistry: Thallus K+ yellow then red, P+ yellow-orange, C–, UV–; containing norstictic acid (major), connorstictic acid (trace).

Etymology: This species is named for its similarity to *Amandinea coniops* and the presence of norstictic acid.

Remarks
Amandinea norconiops is characterized by the crustose, areolate to bullate, grey-brown to brown thallus, the inspersed subhymenium, the immersed then broadly adnate discs, the *Physconia*- then *Buellia*-type ascospores which become constricted at the septum with age and have a rugulate to microrugulate outer wall, and by the presence of norstictic acid. *Amandinea coniops*, a common saxicolous species in Antarctica, is similar (Lamb 1968), but differs in having a non-inspersed subhymenium and in lacking lichen substances. Although I have examined only the type specimen, this species has been reported as common in western Antarctica (Øvstedal & Lewis-Smith 2001, as *Amandinea coniops* containing norstictic acid).

2. Buellia tabarina Elix, sp. nov. Fig. 2
MycoBank No. **MB 847041**

Similar to *Buellia russa* (Hue) Darb., but differs in having a brown to dark brown, areolate thallus, and a thinner hymenium, 60–75 µm thick.

Type: Antarctica, Graham Land, Trinity Peninsula, Hope Bay, low hill on E side of bay, on loose stones, *I.M. Lamb s.n.* [Operation Tabarin no. 2385A], 16.iv.1945 (holotype – BM).

Thallus crustose, to 30 mm wide and 1 mm thick, epilithic, areolate; areoles 0.2–1 mm wide, contiguous to mainly separate, weakly convex; upper surface brown to dark brown, shiny, cracked; prothallus marginal, black or not apparent; photobiont cells 10–17 µm wide; medulla K+ yellow then red, forming red needle-like crystals, lacking calcium oxalate (H_2SO_4–), I–. *Apothecia* 0.2–0.8 mm wide, abundant, lecideine, roundish, scattered, broadly adnate; disc black, epruinose, plane to weakly convex; proper exciple thick, persistent, in section 50–75 µm thick, outer part dark olive-brown to greenish black, N+ purple to purple-brown, inner part brown. *Epihymenium* 10–15 µm thick, olive-brown to brown-black or greenish black, N+ red to purple-brown. *Hypothecium* 50–180 µm thick, dark brown to brown-black, K+, forming red needle-like crystals. *Hymenium* 60–75 µm thick, colourless, not inspersed; subhymenium 10–20 µm thick, pale brown, not inspersed; paraphyses 1–2.5 µm wide, sparingly branched, with apices 3–4 µm wide and dark brown caps. *Asci* 8-spored, *Bacidia*-type. *Ascospores Physconia*- then *Buellia*-type, 1-septate, pale then dark brown, ellipsoid, 13–[*16.2*]–18 × 7–[*8.0*]–9 µm, becoming constricted at the septum with age; outer wall microrugulate. *Pycnidia* common, punctiform, superficial or emergent; ostiole black. *Conidia* bacilliform, 4–5 × 0.7–1 µm.
Chemistry: Thallus K+ yellow then red, P+ yellow-orange, C–, UV–; containing norstictic acid (major), connorstictic acid (trace).

Etymology: This species is named after Operation Tabarin, the code name for a British expedition to the Antarctic during World War II, when the type material was collected.

Remarks
Buellia tabarina is characterized by the crustose, areolate brown to dark brown thallus, the broadly adnate discs, the *Physconia*- then *Buellia*-type ascospores which become constricted at the septum with age and have a microrugulate outer wall, and by the presence of norstictic acid. *Buellia russa*, a common saxicolous species in Antarctica, is similar (Lamb 1968), but differs in having a continuous thallus and thicker hymenium, 70–100 µm thick. At present this species is known only from the type specimen.

New combination

Buellia cycloplaca (I.M.Lamb) Elix, comb. nov.
Mycobank No. **MB 847040**

Basionym: *Buellia russa* var. *cycloplaca* I.M.Lamb, *British Antarctic Survey Reports* **61**, 39 (1968).

Type: Antarctica, Graham Land, Trinity Peninsula, Hope Bay, low hill on E side of Bay, *I.M. Lamb s.n.*, 16.iv.1945 (holotype – BM 001096328, not seen).

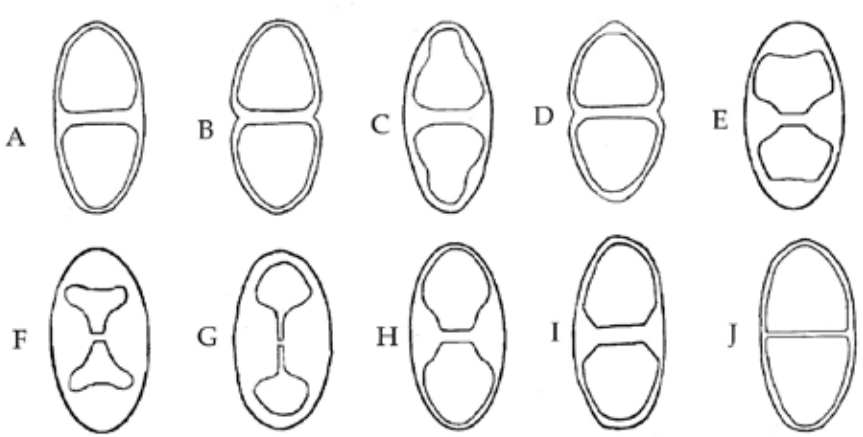
Thallus crustose, to 35 mm wide and 50 µm thick, forming orbicular rosettes, 35 mm wide with subeffigurate margins, areolate within; areoles plane to convex, 0.25–0.5 mm wide; upper surface grey to dark grey; prothallus marginal, distinct, black to brown-black, radiate-fimbriate, 1–2 mm wide, to 0.2 mm thick; medulla white, lacking calcium oxalate (H_2SO_4–), I–; photobiont cells 5–9 µm wide. *Apothecia* 0.4–0.7 mm wide, lecideine, broadly adnate, round; disc black, epruinose, plane to weakly convex. *Excipulum* persistent, in section 30–50 µm thick, outer part dark olive-brown to greenish black, N+ purple to purple-brown, inner part brown. *Epihymenium* 10–15 µm thick, olive-brown to brown-black or greenish black, N+ purple to purple-brown. *Hypothecium* 50–150 µm thick, dark brown to brown-black, K+, forming red needle-like crystals. *Hymenium* 70–85 µm thick, colourless, not inspersed; subhymenium 10–20 µm thick, pale brown, not inspersed; paraphyses 1–2.5 µm wide, sparingly branched, with apices 3–4 µm wide and dark brown caps. *Asci Bacidia*-type, 8-spored. *Ascospores Buellia*-type, brown, ellipsoid, 11–[*12.9*]–15 × 5–[*6.5*]–8 µm, older spores rarely constricted at the septum; outer spore-wall weakly ornamented. *Pycnidia* immersed, black, punctiform. *Conidia* bacilliform, 3–4 × 0.7–1 µm.
Chemistry: Thallus K+ yellow then red, P+ yellow-orange, C–, UV–; containing norstictic acid (major), connorstictic acid (trace).

Remarks
This species is characterized by the grey to dark grey thallus with subeffigurate, radiate margins where the marginal lobes are bordered by a thin, brown-black to black, radiate-fimbriate prothallus, the lecideine apothecia, and *Buellia*-type ascospores, 11–15 × 5–8 µm, *Buellia russa* lacks the subeffigurate marginal lobe and has larger ascospores, 12–[*15.4*]–20 × 6–[*8.6*]–10 µm (Lamb 1968). It resembles some forms of *Buellia frigida* Darb., but the marginal lobes of the latter are rounded at the apices, and it lacks any marginal prothallus and has longer conidia, 4–6 µm long. This species has been reported from several localities in the Antarctica Peninsula. A detailed description and illustrations are also provided by Lamb (1968 – as *Buellia russa* var. *cycloplaca*). The differences between this lichen and *B. russa* warrant its recognition as a distinct species rather than just a variety.

SPECIMEN EXAMINED
Antarctica. ● Graham Land, Trinity Peninsula, Hope Bay, N flank of Mt Flora, 305 m alt., *I.M. Lamb 2853*, 6.i.1946 (BM000734825).

Keys to the buellioid lichens of Antarctica

Key A. Species growing on soil, lignum or bryophytes.
Key B. Species growing on rock; thallus with effigurate or subeffigurate margins.
Key C. Species growing on rock; thallus lacking effigurate or subeffigurate margins.



Types of ascospores. A = *Buellia*-type; B = *Buellia*-type (constricted); C = *Callispora*-type; D = *Cratiria*-type; E = *Dirinaria*-type; F = *Mischoblastia*-type; G = *Orcularia*-type; H, I = *Physconia*-type; J = *Rinodinella*-type.

Key A. Species growing on soil, lignum or bryophytes

1 Thallus thin, effuse; ascospores 12–15 × 5–8 µm; conidia filiform, curved, 12–18 µm long ..... **Amandinea punctata**
1: Thallus thick, substantial; ascospores 15–28 × 7–13 µm; conidia bacilliform, straight, 3–6 µm long 2

2 Thallus lacking lichen substances; epihymenium aeruginose, N+ purple or brown or N–; ascospores invariably 1-septate 3
2: Thallus containing lichen substances; epihymenium brown, N–; ascospores often with 1 or 2 endosepta 4

3 Epihymenium aeruginose-black, N+ red-violet to purple-brown..... ..... **Tetramelas grimmiae**
3: Epihymenium dark brown or dark olive-brown, N–. ..... **Tetramelas grevei**

4 Upper surface whitish; thallus C–, UV–; xanthones absent .. **Tetramelas papillatus**
4: Upper surface yellow or yellow-grey; thallus C+ orange, UV+ orange; xanthones present..... 5

5 Thallus containing calcium oxalate [H_2SO_4+] and norstictic acid [K+ yellow then red]..... **Tetramelas austropapillatus**
5: Thallus lacking calcium oxalate [H_2SO_4–] and norstictic acid [K–] ..... **Tetramelas graminicola**

Key B. Species growing on rock; thallus with effigurate or subeffigurate margins

1 Upper surface sorediate 2
1: Upper surface esorediate 3

2 Usnic acid present; conidia curved, filiform ..... **Amandinea clearyi**
2: Usnic acid absent; conidia bacilliform..... **Buellia subfrigida**

3 Epihymenium aeruginose to aeruginose-black, N+ purple-brown..... 4
3: Epihymenium brown to dark brown, N– 5

4 Marginal prothallus absent ..... **Buellia frigida**
4: Marginal prothallus present..... **Buellia cycloplaca**

5 Thallus pulvinate; apothecia lecanorine ..... **Amandinea petermannii**
5: Thallus not pulvinate; apothecia lecideine 6

6 Apothecia mainly plane, 0.2–0.5 mm wide; ascospores 14–18 × 7–10 µm .....
..... **Amandinea babingtonii**
6: Apothecia soon convex, 0.5–1 mm wide; ascospores 13–22 × 6–10 mm 7

7 Ascospores 18–22 × 8–10 µm ..... **Buellia bouvetii**
7: Ascospores 13–18 × 6–8 µm ..... **Amandinea latemarginata**

Key C. Species growing on rock; thallus lacking effigurate or subeffigurate margins

1 Upper surface sorediate 2
1: Upper surface not sorediate 3

2 Soralia discrete, prominent; thallus containing usnic acid..... **Buellia soredians**
2: Soredia developing from surface fissures; thallus lacking lichen substances
..... **Buellia falklandica**

3 Ascospores *Orcularia*- then *Physconia*-type 4
3: Ascospores *Physconia*- or *Buellia*-type 5

4 Thallus dark grey-brown; ascospores 15–22 × 8–14 µm..... **Buellia melanostola**
4: Thallus grey to dark ash-grey; ascospores 14–18 × 6–9 µm..... **Buellia perlata**

5 Epihymenium aeruginose to aeruginose-black, N+ purple-brown..... 6
5: Epihymenium brown to dark brown, N– 20

6 Medulla I+ purple to blue-violet 7
6: Medulla I– 11

7 Thallus endolithic, not apparent, or with a few scattered, thalline flecks.....
..... **Buellia vilis**
7: Thallus epilithic 8

8 Thallus areolate; areoles often dispersed; upper surface whitish to dark brown; thallus C–, UV–; xanthones absent 9
8: Thallus continuous, verrucose to rimose-areolate; upper surface yellow or yellow-grey; thallus C+ orange, UV+ orange; xanthones present..... 10

9 Ascospores ellipsoid, *Buellia*-type, 9–15 µm long ..... **Buellia lignoides**
9: Ascospores ellipsoid to broadly fusiform, *Callispora*- to *Physconia*- then *Buellia*-type, 12–20 µm long..... **Tetramelas lokenensis**

10 Thallus verrucose, thick (to 2 mm); medulla strongly I+ blue-violet .....
..... **Tetramelas inordinatus**
10: Thallus rimose-areolate, thin (to 0.2 mm); medulla weakly I+ purple; prothallus black, well-developed..... **Tetramelas nelsonii**

11 Thallus continuous..... 12
11: Thallus of dispersed to contiguous areoles..... 14

12 Thallus lacking lichen substances ..... **Buellia rodseppeltii**
12: Thallus containing lichen substances..... 13

13 Thallus verruculose, K+ yellow; atranorin present..... **Tetramelas drakonensis**
13: Thallus rimose, K+ yellow then red; norstictic acid present..... **Buellia russa**

14 Hypothecium colourless 15
14: Hypothecium brown 17

15 Areoles irregular, flattened, contiguous at least in part ..... **Buellia pallida**
15: Areoles convex, dispersed 16

16 Prothallus thick, extended, often fimbriate..... **Buellia pycnogonoides**
16: Prothallus thin or absent..... **Buellia evanescens**

17 Prothallus absent ..... **Buellia subtegens**
17: Prothallus black..... 18

18 Areoles becoming heaped, pulvinate; thallus not forming rosettes .. **Buellia grisea**
18: Areoles not heaped or pulvinate; thallus often forming rosettes 19

19 Ascospores 13–18 × 7–9 µm..... **Buellia tabarina**
19: Ascospores 8–14 × 5–8 µm ..... **Buellia illaetabilis**

20 Thallus lacking lichen substances. 21
20: Thallus containing lichen substances..... 27

21 Ascospores 7–10 × 3–4 µm. ..... **Buellia minispora**
21: Ascospores 11–20 × 6–11 µm 22

22 Disc gyrose..... **Amandinea subplicata**
22: Disc not gyrose 23

23 Thallus pulvinate; apothecia lecanorine ..... **Amandinea petermannii**
23: Thallus not pulvinate; apothecia lecideine 24

24 Upper surface scabrid, minutely white-punctate to granulose.....
..... **Amandinea angusta**
24: Upper surface smooth..... 25

25 Thallus areolate; areoles dispersed or heaped; ascospores *Physconia*-type .... **Amandinea windmillensis**
25: Thallus continuous; ascospores *Buellia*-type or *Physconia*- then *Buellia*-type ...26

26 Thallus grey to grey-brown, verruculose to subsquamulose; ascospores *Physconia*- then *Buellia*-type ..... **Amandinea coniops**
26: Thallus brown, of congested verrucae; ascospores *Buellia*-type..... ..... **Amandinea isabellina**

27 Thallus K+ yellow then red; norstictic acid present 28
27: Thallus K–; norstictic acid absent.....29

28 Thallus C+ orange, UV+ orange; xanthones present; conidia bacilliform .... **Tetramelas filsonii**
28: Thallus C–, UV–; xanthones absent; condia curved, filiform .... **Amandinea norconiops**

29 Thallus composed of small, cushion-like clumps, 5–15 mm high .... **Tetramelas cladocarpizus**
29: Thallus forming a crust up to 3 mm thick 30

30 Ascospores commonly 3-septate or becoming submuriform .... **Tetramelas granulosus**
30: Ascospores mainly 1-septate, ± with additional endosepta.....31

31 Arthothelin present; ascospores 16–24 × 6–10 µm..... **Tetramelas anisomerus**
31: 6-*O*-Methylarthothelin present 32

32 Ascospores 18–30 × 8–12 µm..... **Tetramelas subpedicellatus**
32: Ascospores 15–21 × 6–9 µm..... **Tetramelas darbishirei**

References

Elix, JA (2018): New combinations of *Tetramelas* (Caliciaceae, Ascomycota) and a key to the species in Antarctica. *Australasian Lichenology* **83**, 42–47.

Elix, JA (2019): Four new species and new records of buellioid lichens (Caliciaceae, Ascomycota) from Antarctica. *Australasian Lichenology* **84**, 33–43.

Elix, JA (2021): Two new species of *Tetramelas* (Caliciaceae, Ascomycota) from Antarctica. *Australasian Lichenology* **88**, 34–39.

Elix, JA; Øvstedal, DO; Broady, PA (2020): A new sorediate species of *Amandinea* (Caliciaceae, Ascomycota) from Antarctica. *Australasian Lichenology* **86**, 70–73.

Lamb, IM (1968): Antarctic lichens II. The genera *Buellia* and *Rinodina*. *British Antarctic Survey Reports* **61**, 1–129.

Øvstedal, DO; Lewis Smith, RI (2001): *Lichens of Antarctica and South Georgia. A Guide to their Identification and Ecology*. Cambridge University Press, Cambridge.

Figure 1. *Amandinea norconiops* (holotype in BM). Scale = 1 mm.

Figure 2. *Buellia tabarina* (holotype in BM). Scale = 1 mm.

A new species of *Porina* (lichenized Ascomycota, Porinaceae) from montane Tasmania, and an updated key to the saxicolous taxa in Australia

Patrick M. McCarthy
64 Broadsmith St, Scullin, A.C.T. 2614, Australia
e-mail: pmcc2614@hotmail.com

Gintaras Kantvilas
Tasmanian Herbarium, Tasmanian Museum and Art Gallery,
P.O. 5058, UTAS LPO, Sandy Bay, Tasmania 7005, Australia
e-mail: Gintaras.Kantvilas@tmag.tas.gov.au

Abstract

Porina nivalis P.M.McCarthy & Kantvilas sp. nov. (Porinaceae) is described from seasonally inundated, montane dolerite pebbles on the Ben Lomond Plateau, north-eastern Tasmania, where the species is under snow for a considerable period of the year. The new lichen is characterized by its diffuse to determinate, continuous to minutely areolate, pale brown or pale grey-brown to dark greyish green thallus containing a trentepohlioid photobiont with exceptionally large cells; also by its very small but prominent, black perithecia, an involucrellum that flushes dark blue to purple in KOH, a mainly pale excipulum, 3-septate ascospores (19–34 × 4.5–9 µm) and minute conidia (1–2.5 × 0.5–0.7 µm). An updated key is provided to the 42 saxicolous species of *Porina* known from Australia and its island territories.

Introduction

Porina Ach. is represented in Australia and its oceanic islands by at least 102 species and infraspecific taxa growing on rock, bark and living leaves. The genus is most diverse on and to the east of the Great Dividing Range, especially in the wet-tropics and subtropics of Queensland; in contrast, it is absent from all semi-arid and arid regions (McCarthy 2001a; McCarthy 2020). The 26 species currently known from Tasmania have distributions that are predominantly southern Australian or southern Australasian, while four are considered to be endemic. In this contribution, *P. nivalis* is described as new from seasonally inundated, montane dolerite pebbles on the Ben Lomond Plateau, north-eastern Tasmania.

Methods

Observations and measurements of photobiont cells, thallus and ascomatal anatomy, asci, ascospores and conidia were made on hand-cut sections mounted in water. Sections of ascomata were also observed in 10% potassium hydroxide (K), and the hymenium was irrigated with Lugol's Iodine (I), with and without pretreatment in K.

Porina nivalis P.M.McCarthy & Kantvilas, sp. nov. Figs 1A, 2A, C, D, F, G, 3, 4
MycoBank No.: **MB 847193**

Characterized by its thin, diffuse to determinate and continuous to minutely areolate, pale brown or pale grey-brown to dark greyish green thallus containing a trentepohlioid photobiont with exceptionally large cells; also very small but prominent, black perithecia, 0.13–0.33 mm diam., an involucrellum that flushes dark blue to purple in KOH, a mainly pale excipulum, narrowly cylindrical asci (100–132 × 11–14 µm), 3-septate ascospores (19–34 × 4.5–9 µm) and minute conidia (1–2.5 × 0.5–0.7 µm).

Type: Australia, Tasmania, Ben Lomond, saddle between Giblin Peak and Legges Tor, 41°32'S, 147°39'E, alt. 1550 m, on dolerite stones in a dried-up puddle in alpine microshrubbery, *J. Jarman s.n.*, 30.xi.2021 (holotype — HO 606219).

Thallus crustose, epilithic, dull, smooth or appearing minutely roughened, pale brown or pale to medium grey-brown, occasionally dark greyish green, to 50(–80) µm thick, diffuse to determinate, sparingly and faintly rimose to richly rimose or areolate, ecorticate; areoles angular and usually irregular, 0.05–0.1 mm in maximum extent; rimae narrow and faint;

thallus appearing subgelatinous when wetted, the rimae becoming obscured. *Prothallus* not apparent; basal layer absent. *Algae Trentepohlia*, occupying the full thickness of the thallus; cells subglobose or broadly ellipsoid, golden orange-brown to dark brown (with age), (15–)20–32(–37) × (12–)15–27(–30) µm, solitary or (usually) in short filaments of up to 4 cells, with walls 2–4(–5) µm thick; interstitial hyphae thin-walled, short-celled, 2.5–4 µm wide, I–. *Ascomata* perithecia, sparse to moderately numerous, solitary, one-third immersed to almost superficial, becoming hemispherical to subconical or subglobose at maturity and often slightly constricted at the base, (0.13–)0.22(–0.33) mm diam. [*n* = 56], dull to glossy black; apex rounded or slightly flattened; ostiole inconspicuous or in a minute, shallow depression. *Involucrellum* extending down to almost level with the excipulum base, 40–50 µm thick towards the apex, to 80 µm thick at the base, not incorporating photobiont cells, reddish black in thin section, darkest towards the outer surface, often somewhat paler near the excipulum, K+ deep blue to purplish, the dissolved pigment leaching abruptly from the involucrellar tissue. *Excipulum* uniformly *c.* 20 µm thick, almost concolorous with the involucrellum near the apex, pale yellowish brown or pale to medium orange-brown laterally and at the base, K– or K+ intensifying; basal cells periclinally elongate, 4–8(–12) × 2–3(–4) µm. *Subhymenium* 15–25 µm thick. *Hymenium* I–. *Paraphyses* simple to very sparingly branched, (0.8–)1–1.5(–2) µm thick for most of their length, long-celled, not constricted at most septa (except basally, where paraphyses can be up to 3.5 µm thick), containing numerous minute guttules, *en masse* these giving the false impression of a hymenium inspersed with granules. *Periphyses* absent. *Asci* 8-spored, narrowly cylindrical; apices rounded to subtruncate, the apical wall containing a faint chitinoid ring, 100–132 × 11–14 µm [*n* = 15]. *Ascospores* hyaline, 3(–4)-septate (less than 1 percent 4-septate), narrowly to broadly fusiform or narrowly oblong, or broader towards the distal end and tapering more gradually towards the proximal, straight or slightly curved, overlapping-uniseriate to irregularly biseriate in the ascus, occasionally slightly constricted at the septa, (19–)25(–34) × (4.5–)6(–9) µm [*n* = 184]; apices rounded, subacute or acute; perispore usually not apparent, or up to 1.5 µm thick; spore contents densely granulate-guttulate, often obscuring the septa. *Pycnidia* sparse to moderately numerous, black, semi-immersed to almost superficial, *c.* 50–80 µm wide; lateral wall and base blackish in thin section, K+ deep blue to purplish (as in the perithecial involucrellum); ostiole faint and depressed or not apparent. *Conidia* narrowly to broadly ellipsoid, oblong-ellipsoid or oblong-fusiform, (1–)1.5–2(–2.5) × 0.5–0.7 µm.

Etymology: The epithet *nivalis* (Latin, of snow, snowy) refers to the type locality where the new species spends a considerable period of the year under snow.

Remarks

The new species is one of a small suite of mainly temperate, saxicolous *Porina* taxa that have a rather nondescript thallus, small but prominent, black perithecia with a uniformly dark involucrellar anatomy, photobiont cells not enclosed by or incorporated within the involucrellum, and narrowly cylindrical asci with mostly 3-septate ascospores (see below). However, *P. nivalis* stands apart from other, broadly similar taxa by virtue of its most remarkable habitat ecology, exceptionally large photobiont cells (an attribute shared by one other species, also a Tasmanian endemic), a reddish black involucellum (in thin section) that, with the addition of KOH, rather dramatically flushes deep blue to purple into a microscope preparation, and paraphyses with thick, minutely guttulate bases.

Among those species most similar to *P. nivalis*, *P. byssophila* (Körb.) Zahlbr., from central, southern and western Europe, North Africa and China, has small, black perithecia with a purple-violet to purple-brown involucrellum that is K+ blue-grey to dark grey-brown. However, the *Trentepohlia* photobiont cells are only 7–14 um diam., the perithecia are commonly clustered, there is an appreciable minority of 5–7-septate ascospores, the conidia are larger (2–4.5 × 1 µm), and the preferred substratum is limestone (McCarthy 1986; Orange *et al.* 2021). The almost cosmopolitan *P. chlorotica* (Ach.) Müll.Arg., a species of siliceous rocks, has small photobiont cells, a purple-brown, grey-brown or greenish black involucrellum (in section) and conidia 2.5–4 × 0.7–1.2 µm (McCarthy 1993; Harada 2016; Orange *et al.* 2021). Finally,

P. psilocarpa P.M.McCarthy, endemic to coastal siliceous rocks in southern New Zealand, has a purple-black involucrellum in section, which is unchanged in KOH, and a concolorous excipulum, and while most ascospores are 3-septate, approximately one-third have 5–7 septa (McCarthy 1993).

To our knowledge, only one other species of *Porina* has a *Trentepohlia* photobiont with such large, thick-walled cells. Thus, while *P. tasmanica* P.M.McCarthy, known from alpine quartz in south-western Tasmania, appears to contain the same *Trentepohlia* species [cells 12–27(–32) × 10–20(–25) µm, with walls 3–6 µm thick], it differs from *P. nivalis* in having perithecia that are 0.4–0.62 mm diam., these being orange-brown superficially and in section, with the involucrellum incorporating algal cells. Furthermore, concolorous pycnidia produce bacilliform to filiform conidia of 5–7 × *c.* 0.5 µm (McCarthy 1993).

While most specimens attributed here to *P. nivalis* show a strong degree of similarity in their comparatively large, 3-septate ascospores and elongate-cylindrical asci, as well as virtual uniformity in their thalli, perithecia and conidia, one collection from the Ben Lomond Plateau is anomalous. While it has thalline morphology and anatomy and most perithecial and pycnidial attributes indistinguishable from *P. nivalis sensu stricto*, this specimen [Ben Lomond, *c.* 750 m SE of Giblin Peak, 41°32'S, 147°40'E, alt. 1530 m, on loose dolerite stones in an intermittent shallow puddle in alpine heathland, *G. Kantvilas 315/22*, 8.ii.2022 (HO)] has shorter asci (72–85 × 10–12 µm, as opposed to 100–132 × 11–14 µm) and smaller ascospores [14–23 × 4–5.5 µm (n = 46); vs 19–34 × 4.5–9 µm; Figs 1B, 2B, E]. Remarkably, it is also the only specimen collected that was not confined to the extremely narrow niche occupied by others (see below); rather it grew on the fully exposed, upper surface of a flat slab of dolerite, 9 by 7 centimetres, in a shallow puddle. These differences are not formalized here, and it is hoped that future collections will help to resolve the true breadth of *P. nivalis* anatomy and environmental preferences.

Distribution and habitat

Tasmanian *Porina* species exhibit some noteworthy ecological patterns. On the one hand, the pantemperate to possibly cosmopolitan *P. leptalea* (Durieu & Mont.) A.L.Sm. inhabits deeply shaded bark and a broad range of siliceous rock types. In marked contrast, many other Tasmanian species occupy far more sharply delimited niches. Thus, *P. blechnicola* Lücking, P.M.McCarthy & Kantvilas appears to be restricted to the pinnules of the fern *Blechnum wattsii*, while the epiphytic *P. decrescens* P.M.McCarthy & Kantvilas and *P. elegantula* Müll.Arg. favour the narrowest band on the undersides of twigs where they are protected from rain drops. At a broader level, *P. meridionalis* P.M.McCarthy is known only from coastal, *Melaleuca*-dominated swamp forests, whereas the extremely inconspicuous *P. bryophila* P.M.McCarthy & Kantvilas grows on epiphytic bryophytes in montane rainforest (McCarthy 2001a).

Porina nivalis is known only from dolerite pebbles at the type and nearby localities on the Ben Lomond Plateau, the largest extent of land over 1500 m elevation in Tasmania. It was first collected by chance (by Jean Jarman) in shallow, seasonal puddles (dry at the time of collection). Two further excursions to understand its local distribution yielded additional collections. The new species appears to be restricted to shallow puddles and gravelly outwashes on the highest, most exposed parts of the plateau. It clearly spends a considerable time of the year under snow, and a further extensive period under water up to several centimetres deep. Most remarkably, it does not grow on the exposed, upper surface of the pebbles, and only rarely on their sides. Its niche is as remarkable as it is physically narrow: that part of the surface that is not exposed to the open sky, is in the water for some of the time, and above the silt that fills the puddle bottoms. This may be a band no more than a few millimetres wide on the sides of the pebbles, or in the tiny cracks and undulations of the lower surface. Such pebbles have been examined for lichens in the past, but never in great detail and exclusively for the conspicuous species that grow on their upper surface. These include mostly the same species that occur more widely in the alpine lithosere, notably numerous (and mostly as yet unidentified) species of Porpidiaceae and Lecideaceae, with depauperate or incipient thalli of *Placopsis* and *Stereocaulon*. Also present is what is possibly an undescribed species of *Trapelia*, which similarly favours seasonally inundated surfaces. The habitat is likely to represent a challenging wonderland of

taxa. While searching for the *Porina*, occasional perithecia and apothecia of several completely unknown taxa were spotted, but never in amounts worthy of retention as herbarium specimens. Also present on one stone was the aquatic *Hymenelia lacustris*.

To date, the species has been found only on Ben Lomond, and only within a fairly small, circumscribed area near Legges Tor and Giblin Peak. Since its first discovery, similar habitats have been searched on some of the higher peaks of the Central Plateau without success. Snow patches, gravel outwashes and shallow puddles abound in Tasmania's high country, but these are yet to reveal their lichenological secrets.

ADDITIONAL SPECIMENS EXAMINED

Tasmania: ● Ben Lomond, type locality, on the underside of loose dolerite pebbles in a seasonal puddle in alpine heathland, *G. Kantvilas 349/22*, 8.ii.2022 (HO); ● Ben Lomond, type locality, on dolerite pebbles submerged in shallow alpine puddles, *G. Kantvilas 559/22*, 29.xi.2022 (HO); ● Ben Lomond, Summit Pass, 41°32'S, 147°39'E, alt. 1510 m, on dolerite pebbles submerged in shallow alpine puddles, *G. Kantvilas 560/22*, 29.xi.2022 (HO); ● Ben Lomond, base of Giblin Peak, 41°32'S, 147°40'E, alt. 1525 m, on dolerite pebbles submerged in small, semi-permanent pool in alpine heathland, *G. Kantvilas 561/22*, 29.xi.2022 (HO); ● Ben Lomond, *c.* 500 m SE of Giblin Peak, 41°32'S, 147°40'E, alt. 1525 m, on loose dolerite pebbles in gravelly outwash in alpine lithosere, *G. Kantvilas 562/22*, 29.xi.2022 (HO).

Key to the saxicolous species of *Porina* in Australia

[Based on the *Flora of Australia* treatment (McCarthy 2001a), expanded to include the Australian oceanic islands, and supplemented by recent records and taxa (McCarthy 1993, 1997, 2001b, 2003, 2008; McCarthy & Kantvilas 2017); for publication details, synonymy and distribution, see McCarthy (2020)].

1 Ascospores submuriform to fully muriform and with numerous locules 2
1: Ascospores with transverse septa only 5

2 Perithecia black, superficial; ascospores submuriform, 40–55 × 8–12 µm; thallus pale to dark grey-brown or olive-brown; coastal SE Australia ..... **P. whinrayi**
2: Perithecia immersed in pale olive-brown, pale yellowish green or creamy buff, thallus-dominated verrucae; ascospores muriform; tropics and subtropics 3

3 Ascospores 42–109 × 13–29 µm, with 12–22 transverse septa; each transverse loculus with (1–)2–3(–4) longitudinal or diagonal septa ..... **P. eminentior**
3: Ascospores 28–54 × 9–15 µm, with 5–14(–17) transverse septa; each transverse loculus with (0–)1(–2) longitudinal or diagonal septa 4

4 Perithecia apex with a broad, black periostiolar area (0.2–0.65 mm wide) that contrasts with the pale grey-green to pale sandy brown thallus; thallus with a brownish black basal layer ..... **P. ocellatoides**
4: Perithecia apex with a periostiolar area (to *c.* 0.1 mm wide) that is orange-brown to dark brown or concolorous with the yellowish green thallus; thallus lacking a brownish black basal layer ..... **P. tahitiensis**

5 Perithecia immersed in the thallus or in thallus-dominated verrucae 6
5: Perithecia semi-immersed to superficial, orange, orange-brown, dark brown or black, not immersed in the thallus or in thallus-dominated verrucae 21

6 Most or all ascospores 3-septate 7
6: Ascospores with 5 or more septa 8

7 Perithecia convex to hemispherical, 0.23–0.36 mm diam.; north-eastern Australia ..... **P. ulceratula**
7: Perithecia ± globose, 0.4–1.4 mm diam.; coastal areas of southern Australia ..... **P. corrugata**

8 Ascospore 5–7(–9)-septate....9
8: Ascospores (7–)9–15(–21)-septate....19

9 Most ascospores with 5 septa....10
9: Most ascospores with 7-septa....11

10 Thallus pale grey-brown; involucrellum purple-black in section; centrum 0.18–0.28 mm diam.; conidia 2–6 × 0.7–1.5 µm .... **P. heterocarpa**
10: Thallus very dark greyish green; involucrellum dark greenish grey to green-black in section; centrum 0.1–0.15 mm diam.; conidia 2–3.5 × 0.8 µm .... **P. fluminea**

11 Perithecia immersed directly in the thallus, not in thallus-dominated verrucae....12
11: Perithecia immersed in ± prominent, thallus-dominated verrucae....13

12 Ascospores 18–29 × 4–6 µm; involucrellum contiguous with the excipulum and extending to excipulum base level; pycnidia 60–80 µm diam. .... **P. crassa**
12: Ascospores 29–60 × 4.5–6 µm; involucrellum apical, spreading laterally, not contiguous with the excipulum; pycnidia 80–150 µm diam. .... **P. pelochroa**

13 Perithecial verrucae 0.24–0.4 mm diam. 14
13: Perithecial verrucae 0.35–0.9 mm diam. 15

14 Thallus 30–60 µm thick; perithecial apex pale to medium orange-brown or reddish brown; ascospores 17–25 × 2.5–4 µm; conidia not known .... **P. mastoidella**
14: Thallus 50–150(–200) mm thick; perithecial apex dull black; ascospores 40–66 × 4–5.5 µm; conidia 4–10 × 1.5–2.2 µm.... **P. riparia**

15 Ascospores 16–44 × (2–)3.5–7 µm....16
15: Ascospores 32–66(–83) × (6–)8–18 µm....18

16 Ascospores 16–31 µm long.... **P. papuensis**
16: Ascospores 24–44 µm long 17

17 Ascospores 2–3.5 µm wide .... **P. tetracerae** var. **persimilis**
17: Ascospores 3.5–7 µm wide.... **P. tetracerae** var. **tetracerae**

18 Perithecial verrucae convex to hemispherical, usually with a blackish periostiolar cap; ascospores 6–13 µm wide .... **P. mastoidea**
18: Perithecial verrucae hemispherical to subglobose, lacking a blackish periostiolar cap; ascospores 10–18 µm wide .... **P. nucula**

19 Ascospores (7–)9(–13)-septate, 51–92 × 9–17 µm.... **P. internigrans**
19: Ascospores (11–)15–17(–21)-septate, 32–70 × 3–5.5 µm....20

20 Ascospores (9–)11–13(–15)-septate, 35–56 µm long; perithecial verrucae with a broad, dark brown to black periostiolar cap.... **P. bellendenica**
20: Ascospores (11–)13–17(–21)-septate, 44–70 µm long; perithecial verrucae lacking a broad, dark brown to black periostiolar cap.... **P. exserta**
21 Perithecia yellow-orange, orange, orange-brown, red-brown or dark brown....22
21: Perithecia blackish to jet-black, at least in surface view 27

22 Ascospores 3-septate....23
22: Ascospores 7(–9)-septate....26

23 Perithecia 0.4–0.62 mm diam.; conidia 5–9 µm long.... **P. tasmanica**
23: Perithecia 0.14–0.45 mm diam.; conidia 1–3 µm long....24

24 Perithecia 0.23–0.45 mm diam.; ascospores 24–37 µm long. .... **P. hyperleptalea**
24: Perithecia 0.14–0.28 mm diam.; ascospores 15–25 µm long....25

25 Ascospores 2.5–4(–5) µm wide .... **P. leptalea**
25: Ascospores 4.5–6.2 µm wide.... **P. fulvula**

26 Perithecia 0.2–0.33 mm diam.; ascospores 19–31 × 4–6.5 µm .... **P. howeana**
26: Perithecia 0.22–0.65 mm diam.; ascospores 33–62 × 2–4.5 µm.... **P. kantvilasii**

27 Ascospores 3-septate....28
27: Ascospores with 5 or more septa....31

28 Involucrellum uniformly black in thin section, not enclosing algae....29
28: Involucrellum outwardly blackish, internally much paler, or only slightly paler within but the involucrellum enclosing algal cells (thin section) 30

29 Involucrellum K– or K+ dark grey-brownish; algal cells 6–14 µm in maximum extent .... **P. chlorotica**
29: Involucrellum K+ deep blue to purple; algal cells 15–37 µm in maximum extent.... **P. nivalis**

30 Thallus filmy, 15–30 µm thick; perithecia 0.14–0.26 mm diam.; conidia 2–3 µm long.... **P. chloroticula**
30: Thallus well-developed, 0.15–0.75 mm thick; perithecia 0.2–0.44 mm diam.; conidia 3–7 µm long.... **P. nigrofusca**

31 Most or all ascospores 5-septate 32
31: Most or all ascospores with 7 or more septa 34

32 Perithecia 0.14–0.22 mm diam. .... **P. adflata**
32: Perithecia 0.2–0.4 mm diam. 33

33 Thallus ecorticate, dark grey-green; conidia 2–3.5 × 0.8 µm.... **P. fluminea**
33: Thallus with a paraplectenchymatous cortex, pale grey-brown; conidia 2–6 × 0.7–1.5 µm .... **P. heterocarpa**

34 Ascospores 9–11(–15)-septate, 41–73 × 2–4 µm.... **P. rhaphidiophora**
34: Most or all ascospores (5–)7(–9)-septate....35

35 Ascospores usually constricted in the middle and entwined within the ascus, 40–59 × 2–3.5 µm .... **P. constrictospora**
35: Ascospores not constricted in the middle, usually overlapping and biseriate within the ascus, usually shorter and broader 36

36 Involucrellum with a blackish outer layer (thin section), internally paler and enclosing algal cells 37
36: Involucrellum ± uniformly black in thin section, sometimes containing a few algal cells near the base (thin section) 38

37 Perithecia 0.24–0.5 mm diam., blackish; excipulum 35–45 µm thick at the sides and base of the centrum; ascospores fusiform or narrowly oblong, 37–65 × 5–8 µm .... **P. australis**
37: Perithecia 0.22–0.65 mm diam., usually medium to dark orange-brown (in shade) to blackish (in full sunlight); excipulum 15–30 µm thick at the sides and base of the centrum; ascospores elongate-fusiform to filiform, 33–62 × 2–4.5 µm .... **P. kantvilasii**

38 Perithecia 0.14–0.28 mm diam. 39
38: Perithecia (0.2–)0.25–0.5(–0.97) mm diam. 40

39 Thallus medium to dark grey; perithecia 0.17–0.28 mm diam.; centrum 0.15–0.24 mm diam.; excipulum black..... **P. malmei**
39: Thallus medium green; perithecia 0.14–0.25 mm diam.; centrum 0.1–0.15 mm diam.; excipulum hyaline..... **P. deminuta**

40 Perithecia mostly 0.25–0.5 mm diam. 41
40: Perithecia 0.46–0.7(–0.97) mm diam. 43

41 Ascospores 40–66 × 4–5.5 µm; conidia 4–10 × 1.5–2.2 µm; on aquatic rocks ....**P. riparia**
41: Ascospores 20–50 µm long; conidia (if present) 2–4 × 0.5–1.2 µm; usually on damp, sheltered rocks 42

42 Ascospores (3–)5–7(–9)-septate, 3.5–6.5 µm wide; thallus not filmy or gelatinous when wetted..... **P. guentheri**
42: Ascospores 7–9(–11)-septate, 5.5–8 µm wide; thallus filmy and gelatinous when wetted .....**P. aluniticola**

43 Thallus dark green to greenish black; involucrellum 60–90 µm thick; conidia 3–7 µm long .....**P. aptrootii**
43: Thallus pale grey-green; involucrellum 80–150(–200) µm thick; conidia 3–4 µm long .. ..**P. mariae**

Acknowledgements

For making the first collection of the new species available to us, we thank Jean Jarman. The 2022 Tasmanian Museum and Art Gallery's Expedition of Discovery to Ben Lomond was generously supported by The Friends of TMAG, Penny Clive (*Detached*) and Julia Farrell (*The Federal Group*). GK thanks fellow expeditioners Matthew Baker, Lyn. Cave, John Davies, Miguel se Salas and Jean Jarman for their companionship during quests for additional collections.

References

Harada, H (2015): Saxicolous and corticolous species of *Porina* (lichenized Ascomycota, Porinaceae) of Japan (part 1). *Lichenology* **14**, 1–26.
Harada, H (2016): Saxicolous and corticolous species of *Porina* (lichenized Ascomycota, Porinaceae) of Japan (part 2). *Lichenology* **14**, 91–118.
McCarthy, PM (1986): Some interesting additions to the lichen flora of Ireland. *Nova Hedwigia* **43**, 367–372.
McCarthy, PM (1993): Saxicolous species of *Porina* Müll.Arg. (Trichotheliaceae) in the Southern Hemisphere. *Bibliotheca Lichenologica* **52**, 1–134.
McCarthy, PM (1997): Three new species of Trichotheliaceae from Lord Howe Island, Australia. *Lichenologist* **29**, 229–236.
McCarthy, PM (2001a): Trichotheliaceae. *Flora of Australia* **58A**, 105–157.
McCarthy, PM (2001b): The *Trichotheliaceae* of Christmas Island, Indian Ocean. *Lichenologist* **33**, 393–401.
McCarthy, PM (2003): Additional lichen records from Australia 51. Some aquatic pyrenolichens from Kosciuszko National Park, Snowy Mountains, New South Wales. *Australasian Lichenology* **52**, 16–18.
McCarthy, PM (2008): Additional lichen records from Australia 68. Tropical pyrenolichens. *Australasian Lichenology* **62**, 10–16.
McCarthy, PM (2020): *Checklist of the Lichens of Australia and its Island Territories*. http://www.anbg.gov.au/abrs/lichenlist/introduction.html (Version 1 March 2020). ABRS, Canberra.

McCarthy, PM; Kantvilas, G (2017): A new species of *Porina* (lichenized Ascomycota, Porinaceae) from Tasmania. *Telopea* **20**, 109–113.
Orange, A; Cannon, P; Malíček, J; Sanderson, N; Coppins, B; Simkin, J (2021): Ostropales: Porinaceae, including the genus *Porina*. *Revisions of British and Irish Lichens* **4**, 1–12.

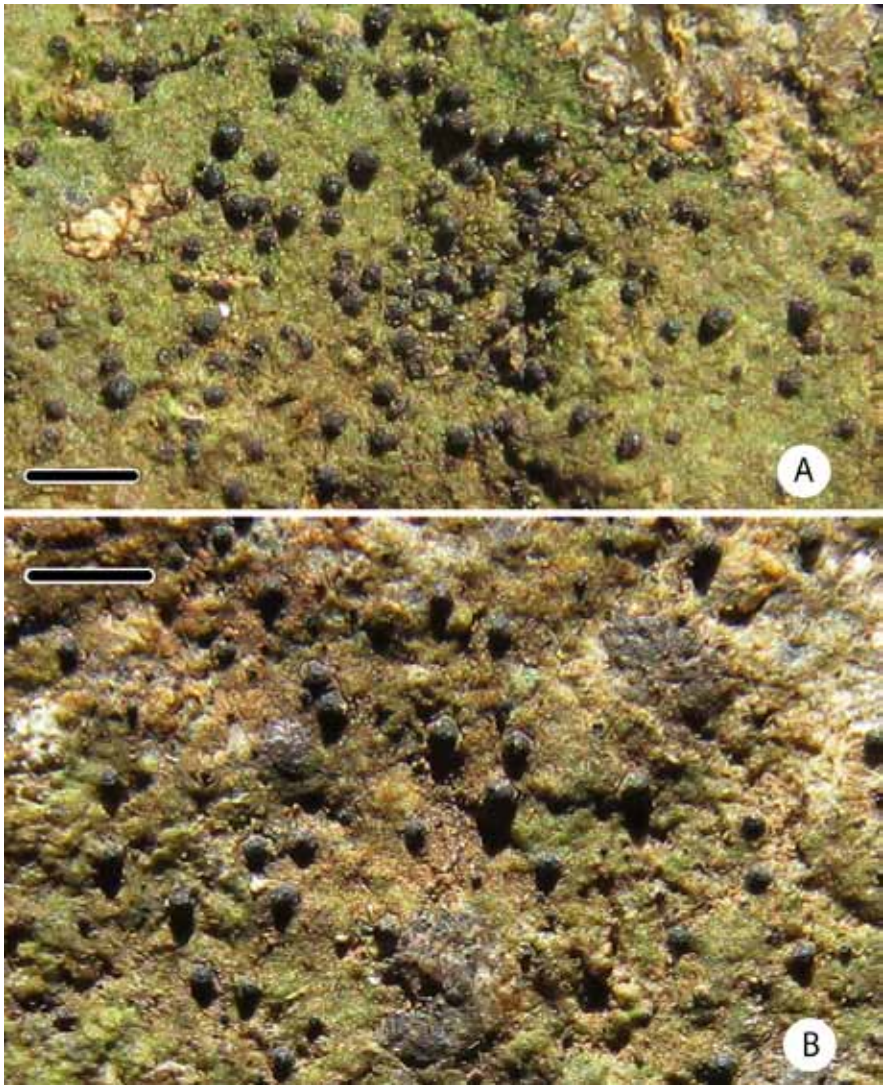


Figure 1. **A**, Holotype of *Porina nivalis*. **B**, *Porina aff. nivalis* (G. Kantvilas 315/22). Scales: 1 mm.

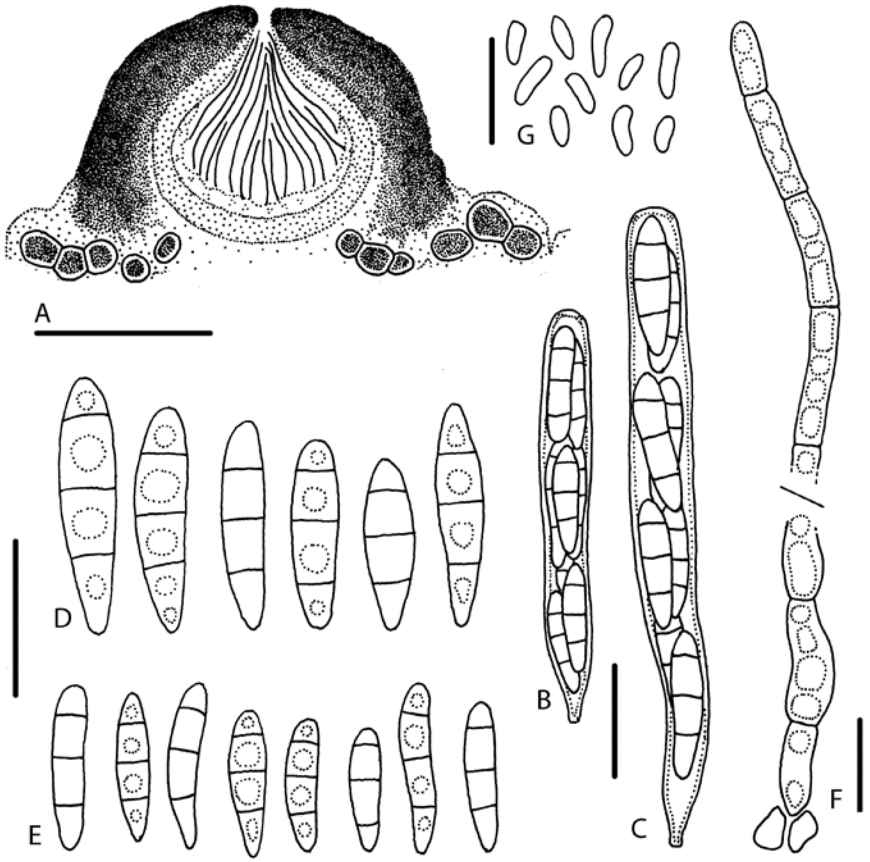


Figure 2. *Porina nivalis* (holotype). **A**, Sectioned perithecium and adjacent thallus (semi-schematic). **C**, Ascus. **D**, Ascospores. **F**, Base and distal part of a paraphysis. **G**, Conidia. *Porina aff. nivalis* (G. Kantvilas 315/22). **B**, Ascus. **E**, Ascospores. Scales: A = 0.1 mm; B–E = 20 µm; F, G = 5 µm.

Figure 3. Habitat of *Porina nivalis*. Shallow alpine puddle with slabs of bedrock and small pebbles, commonly bound together by the reddish *Parasiphula fragilis*. The *Porina* occurs on the sides or undersides of the smallest stones.

Figure 4. Habitat of *Porina nivalis*. Gravelly outwash dominated by the mosses *Grimmia* and *Andreaea*. In such comparatively dry sites, the *Porina* is likely to be on the undersides of the pebbles, but clear of the silty base.

Additional lichen records from New Zealand (53)

Patrick M. McCarthy
64 Broadsmith St, Scullin, A.C.T. 2614, Australia
e-mail: pmcc2614@hotmail.com

Abstract
Four lichen species are reported for the first time from New Zealand: *Gyalidea japonica* Harada & Vězda, *Lecanora sphaerospora* Müll.Arg., *Megalaria melaloma* (C.Knight) Kantvilas and *Rhizocarpon infernulum* (Nyl.) Lynge.

Introduction

The late William (Bill) Ewers (1934–2005) was a diligent collector of lichens, mainly in eastern Australia during the period 1985–1991. Following visits to New Zealand in 1988 and 1989, several hundred specimens were deposited in the Australian National Herbarium (CANB). A recent investigation of undetermined and partially determined Ewers collections has revealed four species that are reported here for the first time from New Zealand.

New records

Gyalidea japonica Harada & Vězda, *Nat. Hist. Res.* **1**(2), 14 (1991) Figs 1 & 2

Thallus epilithic, continuous to sparingly rimose, dull, minutely uneven, off-white to very pale greenish grey, very thin [30–60(–80) µm], ecorticate, I–, not containing calcium oxalate (H_2SO_4–). Algae chlorococcoid, 10–17(–21) µm diam. Prothallus not apparent. Apothecia solitary and scattered, adnate to subsessile, biatorine, (0.18–)0.30(–0.44) mm diam. [*n* = 25]; disc initially urceolate, subsequently concave to plane, minutely uneven, dull black, epruinose; margin concolorous with the disc, minutely radially fissured and ridged, *c.* 30–40 µm thick, entire, usually rather prominent and persistent, often partly overgrown by the thallus. Proper exciple ± cupulate, laterally 25–40 µm thick, 10–20 µm thick and uniformly hyaline at the base; lateral excipulum bilayered: with an outer, dark red-brown to brown-black layer 10–15(–20) µm thick (K–, N+ intensely red-brown), of radiating and anastomosing, pigmented hyphae 2–3 µm wide, the outermost cells rounded and 2.5–4 µm diam.; inner layer hyaline, 15–25 µm thick (K–, N–), of more loosely arranged, anastomosing hyphae (1.5–2 µm thick), these merging almost imperceptibly with the simple paraphyses of the hymenium. Hypothecium hyaline to pale yellowish, 15–25 µm thick, K–, N–, patchily KI+ pale violet. Hymenium 60–80 µm thick, not inspersed with oil droplets, granules or crystals, non-amyloid, K–, N–. Epihymenium 10–15(–25) µm thick, with an uneven surface, olive-brown or medium to dark reddish brown, an extracellularly pigmented layer, K–, N+ orange-brown. Paraphyses simple or with sparse branches, 0.7–1 µm thick, loose in water, loosening further in K; apices neither swollen nor pigmented. Asci narrowly to broadly clavate or clavate-cylindrical, 8-spored, 45–53 × 15–20 µm; wall and contents non-amyloid; apex rounded at maturity; tholus lacking an ocular chamber and obvious apical apparatus. Ascospores colourless, submuriform, with 6–9(–11) cells in optical view, narrowly to broadly ellipsoid or almost subglobose, biseriate or massed in the ascus, thin-walled, lacking a perispore, (14–)17(–20) × (7–)9(–11) µm [*n* = 20]. Pycnidia not seen.

This lichen is characterized by the thin and rather nondescript thallus with small, black, adnate to sessile apothecia and small, submuriform ascospores. It is one of several silicolous species, including *G. costaricensis* Vězda & Hafellner, *G. pacifica* Harada & Vězda and *G. saxicola* (Groenh.) Hafellner & Vězda, which have been distinguished principally by the size and pigmentation of the dark apothecia and the thickness of the hymenium (Harada & Vězda 1991, 1996; Vězda & Poelt 1991). The specimen from New Zealand is a good match for *G. japonica*, which is already known from siliceous rocks in Japan and Taiwan (Harada & Vězda 1991; Aptroot & Sparrius 2003).

SPECIMEN EXAMINED
New Zealand. ● South Island, Canterbury, 35.5 km SW of Tekapo, towards Mt Cook, 44°11'S, 170°14'E, on siliceous stones in a rocky area near road, *W.H. Ewers 5214*, 10.xi.1989 (CANB).

Lecanora sphaerospora Müll.Arg., *Hedwigia* **31**, 196 (1892) Fig. 3

The thallus is dispersed-areolate and ecorticate, with bullate, whitish grey to greenish grey or grey areoles; the upper surface is cracked into solid angles, giving it a crystalline appearance. Apothecia are immersed to sessile, 0.6–2 mm diam., with a pinkish brown to dark brown disc that is heavily bluish grey-pruinose with a thin, whitish grey margin. The amphithecium contains large and small crystals, while the latter are soluble in K. The epihymenium is olive-brown to dark brown, *c.* 10 µm thick, with K-soluble crystals, and the hymenium, subhymenium and hypothecium are hyaline. Paraphyses are sparingly branched and not or only slightly thickened apically, while the simple ascospores are broadly ellipsoid and 8–11.5 × 6–8.5 µm. The thallus and apothecial margin are K+ yellow, C– and Pd+ pale orange; containing atranorin (major), zeorin (major) and chloroatranorin (minor) (Lumbsch & Elix 2004).

This species is already known from exposed limestone in southern Australia, where it is common, as well as South Africa.

SPECIMEN EXAMINED
New Zealand. ● North Island, Central Hawkes Bay, *c.* 6.5 km W of Waipukurau on Highway 2, 38°59'S, 176°29'E, on crumbling limestone cliff, *W.H. Ewers 2901*, 29.iii.1988 (CANB).

Megalaria melaloma (C.Knight) Kantvilas, *Muelleria* **26**, 67 (2008) Fig. 4

Lecidea melaloma C.Knight, *Trans. Linn. Soc. London*, ser. 2, **2**, 45 (1882)

This species is characterized by the usually rather smooth, pale, crustose thallus, and black, often sessile apothecia, 0.8–1(–1.5) mm diam., with a plane to convex disc, a weakly pigmented or hyaline inner exciple and hypothecium, and small to medium-size, 1-septate ascospores, mostly in the range 16–28 × 8–12 µm (Kantvilas 2008).

Megalaria melaloma is a common epiphyte in a range of forest types in south-eastern Australia (Victoria, Tasmania, New South Wales, and the Australian Capital Territory). In view of its comparative abundance among the Ewers collections, it is likely to have a similarly broad range of habitats in New Zealand.

SPECIMENS EXAMINED
New Zealand. ● North Island, Bay of Plenty, *c.* 10 km W of Murupara, Kaingaroa Forest, 38°34'S, 176°32'E, on bark, *W.H. Ewers 2822*, 28.iii.1988 (CANB); ● South Island, Canterbury, Cass, behind field station, 43°02'S, 171°45'E, on bark, *W.H. Ewers 5356, 5398, 5400, 5433*, 6.xi.1989 (CANB); ● Canterbury, Arthurs Pass National Park, Hawden [Hawdon] River picnic area, 43°00'S, 171°45'E, on bark in alluvial river terraces, *W.H. Ewers 5462, 5481*, 7.xi.1989 (CANB).

Rhizocarpon infernulum (Nyl.) Lynge, *Rhodora* **36**, 158 (1934) Figs 5 & 6

Lecidea infernula Nyl., *Flora* **68**, 440 (1885)

Thallus epilithic, off-white to pale greenish grey or patchily medium grey, to 70(–100) µm thick, rimose to sparingly areolate (mainly around apothecia), K–. Areoles dull, smooth to minutely uneven, slightly concave to plane, 0.3–0.6(–0.8) mm wide, angular, irregular, ecorticate. Algae chlorococcoid, globose to ellipsoid, 6–14(–16) µm diam. Medulla thin, white, heavily impregnated with minute rock fragments and crystals, I–. Prothallus and hypothallus not apparent. Apothecia numerous, uniformly dull black, lecideine, adnate to subsessile, mostly round, occasionally somewhat angular, usually solitary, sometimes paired, (0.33–)0.46(–0.66) mm diam. [*n* = 50]; disc smooth, plane to slightly convex, epruinose; margin 50–80 µm thick, entire to minutely radially fissured, not prominent, persistent, or becoming excluded. Proper exciple annular, uniformly brown-black (thin section) and 40–50(–60) µm thick. Epihymenium aeruginose-black, 10–18 µm thick. Hypothecium dark brown to brown-black, 80–110 µm thick, not inspersed, N+ deep red-brown. Hymenium 70–85 µm thick, hyaline to pale greenish brown, not inspersed, KI+ blue, K–, N–. Paraphysoids tightly conglutinate in water, loosening in K, simple or sparingly to abundantly anastomosing (especially towards the apices), 1.5–2(–2.5) µm thick; apical cells swollen, 2.5–4.5(–6) µm wide, with brown-black

caps. Asci narrowly to broadly clavate or clavate-cylindrical, *Rhizocarpon*-type (Hafellner 1984), (6–)8-spored, 55–65 × 16–24 µm [*n* = 10]. Ascospores hyaline, 1-septate, narrowly ellipsoid to broadly ellipsoid or obclavate, usually constricted at the septum, the distal cell often broader and more rounded than the proximal, irregularly biseriate or massed in the ascus, (11–)14(–17) × (6–)7(–8) µm [*n* = 30]; perispore 2–3 µm thick.

The species was first described from the northern Pacific Ocean; it also occurs in North America, Greenland, and western Eurasia (Fryday 2002). More recently, it has been reported from the Falkland Islands (Calvelo & Fryday, 2006) and China (Zhao *et al.* 2013).

SPECIMEN EXAMINED

New Zealand. ● South Island, Canterbury, Broken River, SE of Arthurs Pass, 43°08'S, 171°41'E, alt. *c.* 1500 m, on siliceous rock above the snowline, *W.H. Ewers 5704*, 4.xi.1989 (CANB).

References

Aptroot, A; Sparrius, LB (2003): New microlichens from Taiwan. *Fungal Diversity* **14**, 1–50.

Calvelo, S; Fryday, AM (2006): New reports of lichens from Argentine Tierra del Fuego and the Falkland Islands. *Bryologist* **109**, 372–380.

Fryday, AM (2002): A revision of the species of the *Rhizocarpon hochstetteri* group occurring in the British Isles. *Lichenologist* **34**, 451–477.

Hafellner, J (1984): Studien in Richtung einer natürlicheren Gliederung der Sammelfamilien Lecanoraceae und Lecideaceae. *Beihefte zur Nova Hedwigia* **79**, 241–371.

Harada, H; Vězda, A (1991): Two new species of gyalectoid lichens from East Asia. *Natural History Research* **1**(2), 13–17.

Harada, H; Vězda, A (1996): *Gyalidea pacifica* (lichenized Ascomycotina, Solorinellaceae), a new gyalectoid lichen from Japan. *Bryologist* **99**, 193–195.

Kalb, K (2001): New or otherwise interesting lichens. I. *Bibliotheca Lichenologica* **78**, 141–167.

Kantvilas, G (2008): Observations on some Tasmanian species of the lichen genus *Megalaria* (Lecanorales: Megalariaceae). *Muelleria* **26**, 64–71.

Lumbsch, HT; Elix, JA (2004): *Lecanora*. *Flora of Australia* **56A**, 12–62.

Vězda, A; Poelt, J (1991): Die Flechtengattung *Gyalidea* Lett. ex Vězda (Solorinellaceae). Eine Übersicht mit Bestimmungsschlüssel. *Nova Hedwigia* **53**, 99–113.

Zhao, Z-T; Li, C; Zhao, X; Zhang, L-L (2013): New records of *Rhizocarpon* from China. *Mycotaxon* **125**, 217–226.

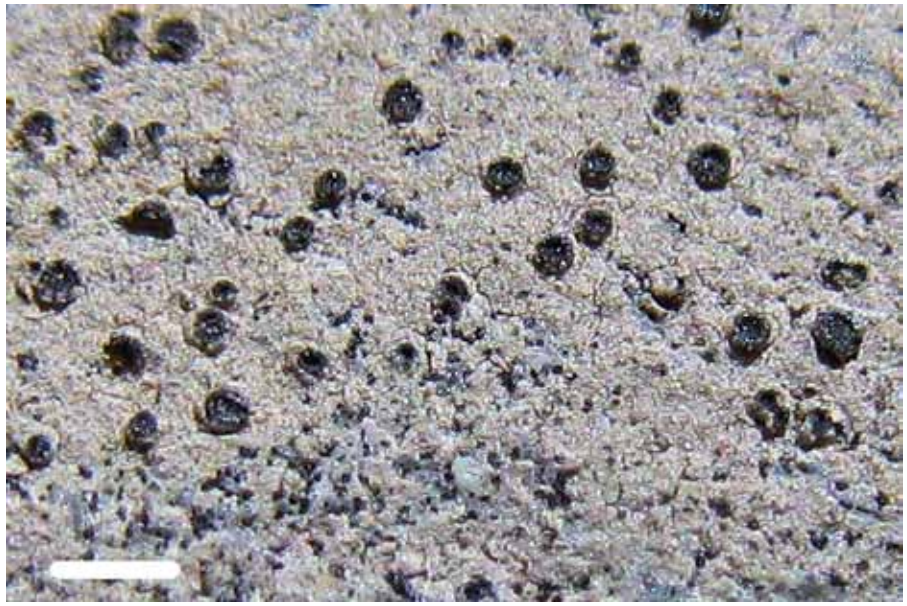


Figure 1. *Gyalidea japonica* (W.H. Ewers 5214). Scale: 1 mm.

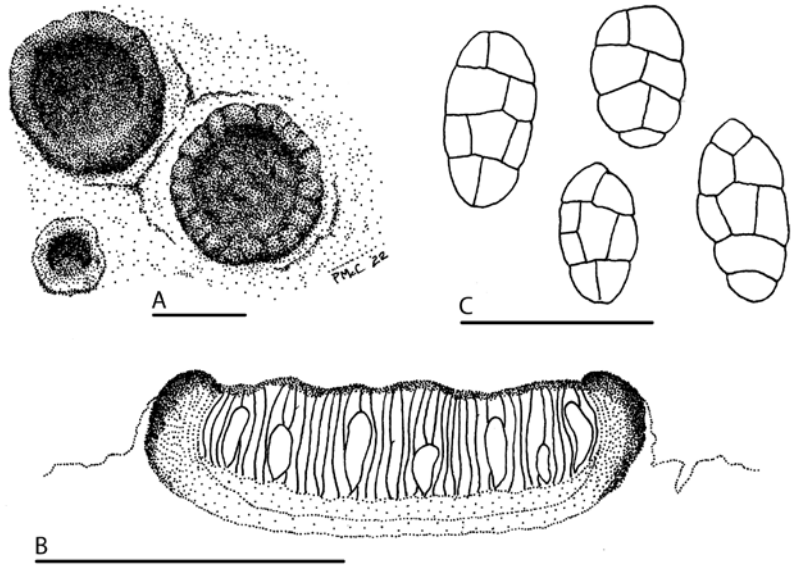


Figure 2. *Gyalidea japonica* (W.H. Ewers 5214). A, Habit of mature and immature apothecia; B, Sectioned apothecium (semi-schematic); C, ascospores. Scales: A, B = 0.2 mm; C = 20 µm.

Figure 3. *Lecanora sphaerospora* (W.H. Ewers 2901). Scale: 1 mm.

Figure 4. *Megalaria melaloma*. A, W.H. Ewers 5462; B, W.H. Ewers 5398. Scales: 2 mm.

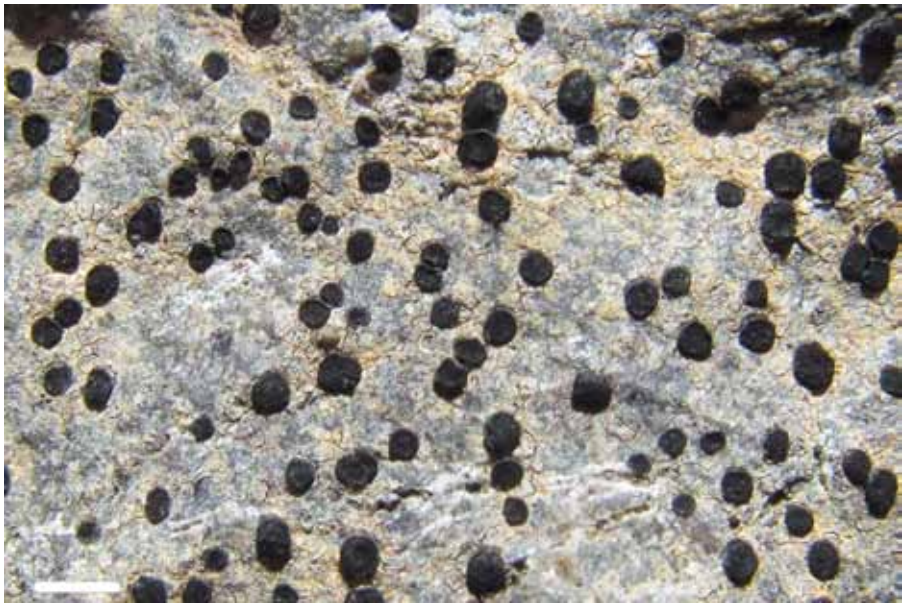


Figure 5. *Rhizocarpon infernulum* (W.H. Ewers 5704). Scale: 1 mm.

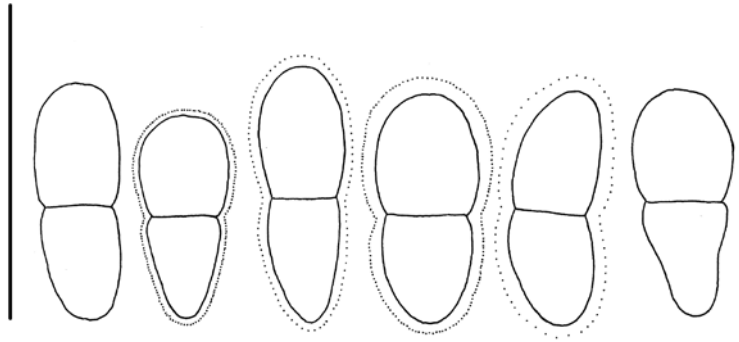


Figure 6. *Rhizocarpon infernulum* (W.H. Ewers 5704). Ascospores. Scale: 20 µm.

Additional lichen records from Australia (90)
New records of buellioid (Caliciaceae) and *Rinodina* species (Physciaceae)

John A. Elix
Research School of Chemistry, Building 137,
Australian National University, Canberra, A.C.T. 2601, Australia
e-mail: John.Elix@anu.edu.au

Abstract
Authentic *Buellia subdisciformis* (Leight.) Vain. var. *subdisciformis* and *Rinodina ficta* (Stizenb.) Zahlbr. are reported for the first time from Australia. New state and territory records are provided for 15 other taxa.

NEW AUSTRALIAN RECORDS

Buellia subdisciformis (Leight.) Vain., *Étud. Class. Lich. Brésil* **1**, 167 (1890) var. **subdisciformis** Fig. 1

Basionym: *Lecidea subdisciformis* Leight., *Lich. Fl. Great Brit.*: 308 (1871). T: Great Britain, Guernsey, S side of Jerbourg, *C. du Bois Larbalestier 9* (holotype – BM, not seen).

Thallus crustose, to 60 mm wide and 1 mm thick, areolate; areoles 0.2–1.2 mm wide; upper surface off-white to pale grey or yellow-grey, sometimes becoming warted; prothallus black, marginal, or absent; medulla white, lacking calcium oxalate (H_2SO_4–), I–; photobiont cells 6–13 µm wide. *Apothecia* 0.4–1.8 mm wide, lecideine, adnate to sessile and constricted at the base, round; disc black, epruinose or white-pruinose when young, plane to weakly convex. *Excipulum* distinct, persistent, in section 20–50 µm thick, dark brown, N–. *Epihymenium* 8–10 µm thick, brown, N–. *Hypothecium* 70–125 µm thick, dark red-brown, K+ forming red needle-like crystals. *Hymenium* 60–85 µm thick, colourless, not inspersed. *Paraphyses* 1–1.5 µm wide, sparsely branched towards apices, these 3–5 µm wide and with brown caps. *Asci Bacidia*-type, 8-spored. *Ascospores Buellia*-type, brown, ellipsoid, 9–[*13.8*]–20 × 6–[*7.5*]–10 µm, not constricted at the septum; outer spore-wall weakly ornamented. *Pycnidia* immersed, black, punctiform. *Conidia* elongate-bacilliform, 6–13 × 0.7–1 µm.
Chemistry: Thallus C–, K+ yellow then red (crystals), P+ yellow-orange, UV–; containing atranorin (major), norstictic acid (major), connorstictic acid (trace).

Remarks
This species was known previously from Europe, Macaronesia, Asia, Africa and North America (Coppins *et al*. 2009). While it has also been reported from New South Wales (Nylander 1886), Queensland (Shirley 1889), Victoria (Filson 1983), Western Australia (Richardson & Richardson 1982), and from unspecified Australian localities (e.g. Coppins *et al*. 2009), no authentic material had previously been seen from Australia.

The lichen is characterized by the off-white to pale grey or yellow-grey crustose thallus with a non-amyloid medulla, the adnate to sessile, lecideine apothecia to 1.8 mm wide, the brown, N– epihymenium, *Buellia*-type ascospores, 9–20 × 6–10 µm, elongate, bacilliform conidia, 6–13 µm long, and the presence of atranorin and norstictic acid (Bungartz *et al*. 2007).

SPECIMENS EXAMINED
New South Wales. ● Stroud–Gloucester road, 37 km S of Gloucester, 32°20’S, 151°55’E, 80 m alt., on boulder in dry sclerophyll forest on steep, rocky W slope, *H. Streimann 43911 pr. p., 43912*, 22.iv.1990 (CANB).

Rinodina ficta (Stizenb.) Zahlbr., *Cat. Lich. Univ.* **7**, 518 (1931) Fig. 2
Basionym: *Lecanora ficta* Stizenb., *Lich. Afric.* **1**, 210 (1890). T: South Africa, Durban, *Wilms*, Feb. 1888; holo: ZT Muyc 30506, associated with *Haematomma africanum fide* H.Mayrhofer, W.Obermayer & W.Wetschnig, *Herzogia* **27**, 7 (2014).

Rinodina boleana Giralt & H.Mayrhofer, *Mycotaxon* **40**, 435 (1991). T: Spain, Alt Camp, Querol, Esblada, *M.Giralt, A.Gómez-Bolea & P.Navarro-Rosinés*, 1988; holo: BCC; iso: GZU, hb. Sheard (not seen).

Thallus crustose, to 35 mm wide, thin, discontinuous or evanescent, minutely granulose; upper surface matt, esorediate, olive-grey to brownish grey; prothallus absent; medulla white, lacking calcium oxalate (H_2SO_4–), I–; photobiont cells 10–22 µm diam. *Apothecia* 0.1–0.4 mm wide, scattered or crowded, lecanorine, broadly adnate to sessile and basally constricted; disc dark brown to black, epruinose, plane to weakly convex. *Thalline excipulum* thin, entire, concolorous with thallus, usually persistent. *Proper excipulum* colourless, narrow, 5–20 µm wide. *Epihymenium* 10–15 µm thick, dark brown, K–, N–. *Hypothecium* 30–60 µm thick, colourless to pale yellow-brown, K–, N–. *Hymenium* 45–70 µm thick, colourless, not inspersed. *Paraphyses* 1.5–1.8 µm wide, simple to rarely branched, with apices 3–6 µm wide and brown caps. *Asci Lecanora*-type, 8-spored. *Ascospores Pachysporaria*-type II, 1-septate, pale olive to brown, ellipsoid, 10–[*12.1*]–16 × 5–[*6.2*]–8 µm, not constricted at the septum; ontogeny of type-B; outer spore-wall smooth; torus and septum indistinct. *Pycnidia* rare, black, immersed. *Conidia* bacilliform, 5–7 × 1 µm.
Chemistry: Thallus K–, P–, C–, UV–; no lichen substances detected.

Remarks
This species was known previously from Europe, South Africa, South America and New Zealand (Mayrhofer *et al*. 2014). It is characterized by the crustose, thin to evanescent, olive-grey to brownish grey thallus, broadly adnate to sessile lecanorine apothecia, *Pachysporaria*-type II ascospores, 10–16 × 5–8 µm, with type-B ontogeny and the absence of lichen substances (Mayrhofer *et al*. 2014).

SPECIMENS EXAMINED
Victoria. ● Winnep, on Heywood–Mount Gambier road near S.A. border, 37°56’S, 141°19’E, on *Acacia*, *W. H. Ewers 580*, 30.xii.1986 (CANB); ● Point Addis, Ironbark Basin Reserve, Point Addis road, on twigs of *Acacia* in *Eucalyptus*-dominated forest, *K.Ralston 1011*, 21.iii.1999 (MEL).

NEW STATE AND TERRITORY RECORDS

Amandinea hypohyalina Elix & P.M.McCarthy, *Australas. Lichenol.* **86**, 31 (2020)
This Australian endemic was previously known from New South Wales and the Australian Capital Territory (McCarthy 2020).

SPECIMEN EXAMINED
Victoria. ● Otway Range region, Wild Dog Creek, Apollo Bay, 38°42’S, 143°39’30”E, on rock, *W. H. Ewers s.n. pr. p.*, 12.vii.1986 (CANB 772376).

Amandinea montana (H.Magn.) Marbach, *Biblioth. Lichenol.* **74**, 93 (2000)
This species was previously known from India, East Africa, Central America (Marbach 2000) and in Australia from Queensland (McCarthy 2020).

SPECIMEN EXAMINED
New South Wales. ● Manning River, 2 km SE of Charity Creek, *c.* 10 km WSW of Wingham, *R.B. Filson 19712* (MEL).

Amandinea nebulosa (Elix & Kantvilas) Elix & Kantvilas, *Australas. Lichenol.* **79**, 30 (2016)
This Australian endemic was previously known from New South Wales and Tasmania (McCarthy 2020).

SPECIMENS EXAMINED
Victoria. ● Talgarno, top of ridge in "Goonabill" (Myers property), 36°04'S, 147°10'E, on rock, *W.H. Ewers 5807*, 18.iv.1990 (CANB); ● Mt Oberon, Wilsons Promontory, 540 m alt., on granite, *H. Mayrhofer 11544 & E. Hierzer*, 30.vii.1992 (GZU).

Amandinea occidentalis Elix & Kantvilas, *Australas. Lichenol.* **72**, 9 (2013)
This Australian endemic was previously known from New South Wales and Western Australia (McCarthy 2020).

SPECIMEN EXAMINED
Victoria. ● Wannon, E side of mouth of Glenelg River, 4.8 km S of Nelson, *R.B. Filson 14609* (MEL).

Amandinea pillagaensis Elix & Kantvilas, *Australas. Lichenol.* **72**, 10 (2013)
This species was previously known from New Zealand and in Australia from Queensland and New South Wales (McCarthy 2020).

SPECIMEN EXAMINED
Victoria. ● Pink Lakes State Park, beside Lake Crosby, 54 km W of Ouyen, 35°03'S, 141°43'E, on trunk of *Heterodendron oleifolium* in grassland with scattered trees, *J. A. Curnow 1451 & H. Lepp*, 13.iii.1987 (CANB).

Baculifera entochlora (J.Steiner) Marbach, *Biblioth. Lichenol.* **74**, 120 (2000)
This species was known previously from East Africa, Réunion, Central and South America (Marbach 2000) and in Australia from Queensland (McCarthy 2020).

SPECIMEN EXAMINED
New South Wales. ● Macquarie Pass, 25 km SW of Wollongong, 34°35'S, 150°34'E, 10 m alt., on branches in *Doryphora sassafras* forest, *D. Verdon 2919A pr. p.*, 12.viii.1977 (CANB).

Baculifera metaphragmia (C.Knight) Elix & Kantvilas, *Australas. Lichenol.* **75**, 32 (2014)
This Australian endemic was previously known from New South Wales, Victoria and Western Australia (McCarthy 2020).

SPECIMENS EXAMINED
Australian Capital Territory. ● Brindabella Ranges, SW side of summit of Mt Coree, WSW of Canberra, 35°18'S, 148°49'E, 1290 m alt., on twigs of *Leptospermum* in open *Eucalyptus pauciflora* woodland, *J. Johnston 2770 pr. p.*, 22.xi.1989 (CANB).
Tasmania. ● S shore of Lake Ada, 41°53'S, 146°29'E, 1150 m alt., on twigs of *Orites acicularis* in alpine heathland, *G. Kantvilas 419/99*, 14.xii.1999 (HO).

Buellia amandineiformis Elix & Kantvilas, *Australas. Lichenol.* **73**, 24 (2013) [as *amandineaeformis*]
This species was known previously from New Zealand and in Australia from the Australian Capital Territory and Tasmania (McCarthy 2020).

SPECIMENS EXAMINED
New South Wales. ● Collector–Gundaroo road, 3 km SW of Collector, 34°55'12"S, 149°24'19"E, 630 m alt., on roadside shale rocks in dry *Eucalyptus* woodland, *J.A. Elix 46750, 46763*, 22.v.2019 (CANB); ● Southern Tablelands, Cuumbeun Nature Reserve, beside Queanbeyan–Captains Flat road, *c.* 6 km SE of Queanbeyan, 35°21'29"S, 149°16'30"E, 730 m alt., on old soil-impregnated woolen jumper, *J.A. Elix 47060*, 2.vi.2020 (CANB); ● 287 km S of Tibooburra on Broken Hill road, on rock, *W.H. Ewers 1143B*, 24.iv.1987 (CANB).
Victoria. ● Picnic area, Anakie Gorge, near Geelong, 37°51'S, 144°15'E, on basalt, *W.H. Ewers 3283A*, 23.ix.1988 (CANB); ● Pyalong–Seymour road, 3 km E of Pyalong, 37°08'S, 144°53'E, 400 m alt., on rocky road cutting, *H. Streimann 36008*, 24.xii. 1985 (CANB).

Buellia cinnabarina U.Grube, *in* U.Grube, H.Mayrhofer & J.A.Elix, *Biblioth. Lichenol.* **88**, 169 (2004)
This Australian endemic was previously known from South Australia (McCarthy 2020).

SPECIMENS EXAMINED
New South Wales. ● London Bridge, 18 km S of Queanbeyan, 35°30'S, 149°16'E, 670 m alt., on calcareous shale in pasture, *J. A. Elix 33078, 33090*, 26.vii.1992; *J.A. Elix 42581*, 20.xii.1996 (CANB).

Buellia conspirans (Nyl.) Vain., *Ann. Acad. Sci. Fenn.*, ser. A, **6**, 88 (1915)
This lichen is already known from the Pacific (New Caledonia, Papua New Guinea), Africa, South America and in Australia from Western Australia, Queensland and New South Wales (Marbach 2000; McCarthy 2020).

SPECIMEN EXAMINED
Northern Territory. ● Litchfield National Park, Wangi Falls, 74 km SW of Batchelor, 13°09'48"S, 130°41'E, 60 m alt., on fallen twigs in monsoon forest, *J.A. Elix 38032*, 5.viii.2005 (CANB).

Buellia cranwelliae Zahlbr., *Denkschr. Akad. Wiss. Wien math.-naturwiss. Kl.* **104**, 375 (1941)
This Australasian species was previously known from New South Wales, Victoria and Tasmania (McCarthy 2020).

SPECIMEN EXAMINED
Western Australia. ● Meelup, NW of Dunsborough, *D., M. & H. Mayrhofer 8530*, 20.viii.1988 (GZU).

Rinodina asperata (Shirley) Kantvilas, *Pap. & Proc. Roy. Soc. Tasmania* **122**, 65 (1988)
This Australian endemic was previously known from Western Australia, South Australia, Queensland, New South Wales, Victoria and Tasmania (McCarthy 2020).

SPECIMEN EXAMINED
Australian Capital Territory. ● Uriarra Forest, Condor Creek, picnic spot, 35°19'S, 148°50'E, on twigs of *Leptospermum* in open *Eucalyptus pauciflora* woodland, *W.H. Ewers 4243*, 24.ix.1989 (CANB).

Rinodina confusa H.Mayrhofer & Kantvilas, *in* H.Mayrhofer, K.Ropin & G.Kantvilas, *Muelleria* **12**, 180 (1999)
This Australian endemic was previously known from South Australia and Tasmania (McCarthy 2020).

SPECIMENS EXAMINED
New South Wales. ● Shingle Ridge, 5 km N of Molong on road to Yeoval, 33°04'22"S, 148°49'45"E, 595 m alt., on dead wood in remnant *Eucalyptus* woodland, *J.A. Elix 38545*, 13.x.2005 (CANB); ● Ford Reserve, Megalong Valley, Blue Mountains, on twigs in dry *Eucalyptus* woodland, *W.H. Ewers 3623*, 6.vii.1989 (CANB); ● 6 km S of Braidwood, 35°28'S, 149°46'E, on bark of deciduous tree, *W.H. Ewers 4022*, 3.ix.1989 (CANB); ● Track to Snowball, Tallaganda State Forest, 44 km E of Moruya, *H. Streimann 60292* (CANB).
Australian Capital Territory. ● Molonglo Gorge Reserve, 1 km E of Canberra, 35°19'46"S, 149°14'59"E, 630 m alt., on trunk of *Callitris endlicheri* in *Callitris-Eucalyptus* woodland, *J.A. Elix 33138 & H. Mayrhofer*, 26.vii.1992 (CANB); ● cork plantation 4 km NW of Capital Hill, Canberra, 35°17'S, 149°04'E, 600 m alt., on stem of *Quercus suber*, *H. Streimann 39285*, 25.iv.1988 (CANB).

Rinodina substellulata Müll.Arg., *Proc. Roy. Soc. Edinburgh* **11**, 461 (1882)
In Australia, this cosmopolitan species is known from Queensland, New South Wales, Victoria and Tasmania (McCarthy 2020).

SPECIMEN EXAMINED
New South Wales. ● Lord Howe Island, junction of tracks to Mutton Bird Point and Intermediate Hill, 31°32'43"S, 159°04'48"E, 60 m alt., on basalt rocks in dry lowland forest, *J.A. Elix 32756A*, 21.vii.1992 (CANB).

Rinodina williamsii H.Mayrhofer, *Beih. Nova Hewigia* **79**, 528 (1984)
This species was known previously from Western Australia, New South Wales, Queensland, Tasmania and Juan Fernandez Islands (Kaschik 2006; McCarthy 2020).

SPECIMEN EXAMINED
Victoria. ● John Good's "Halfpenny Green", Spring Creek Road, Woolsthorpe, 38°11'S, 142°28'E, on basalt, *W.H. Ewers 1269 pr. p.*, 30.v.1987 (CANB).

Acknowledgements
I thank Dr Christine Cargill and Ms Judith Curnow for their kind cooperation in providing access to key collections in CANB.

References
Bungartz, F; Nordin, A; Grube, U (2007): *Buellia* De Not. – In: Nash III, TH; Gries, C; Bungartz, F (eds) *Lichen Flora of the Greater Sonoran Desert Region* **3**, 113–179. Lichens Unlimited, Arizona State University, Tempe.
Coppins, BJ; Scheidegger, C; Aptroot, A (2009): *Buellia* de Not. – In: Smith, CW; Aptroot, A; Coppins, BJ; Fletcher, A; Gilbert, OL; James, PW; Wolseley, PA (eds) *Lichens of Great Britain and Ireland*, pp. 228–238. British Lichen Society, London.
Filson, RB (1983): *Checklist of Australian Lichens*. National Herbarium of Victoria. Department of Conservation, Forests and Lands, Melbourne.
Kaschik, M (2006): Taxonomic studies on saxicolous species of the genus *Rinodina* (lichenized Ascomycetes, Physciaceae) in the Southern Hemisphere with emphasis in Australia and New Zealand. *Bibliotheca Lichenologica* **93**, 1–162.
Marbach, B (2000): Corticole und lignicole Arten der Flechtengattung *Buellia* sensu lato in den Subtropen und Tropen. *Bibliotheca Lichenologica* **74**, 1–384.
Mayrhofer, H; Obermayer, W; Wetschnig, W (2014): Corticolous species of the genus *Rinodina* (lichenized Ascomycetes, Physciaceae) in southern Africa. *Herzogia* **27**, 1–12.
McCarthy, PM (2020): *Checklist of the Lichens of Australia and its Island Territories*. Australian Biological Resources Study, Canberra. Version 1 March, 2020.
http://www.anbg.gov.au/abrs/lichenlist/introduction.html.
Nylander, W (1886): Lichenes nonnulli Australienses. *Flora* **69**, 323–328.
Richardson, RN; Richardson, DHS (1982): A systematic list with distributions of the lichen species of Western Australia, based on collections in the Western Australian Herbarium. *Western Australian Herbarium Research Notes* **7**, 17–29.
Shirley, J (1889): The lichen flora of Queensland. Part IV [and Appendix]. *Proceedings of the Royal Society of Queensland* **6**, 165–218.

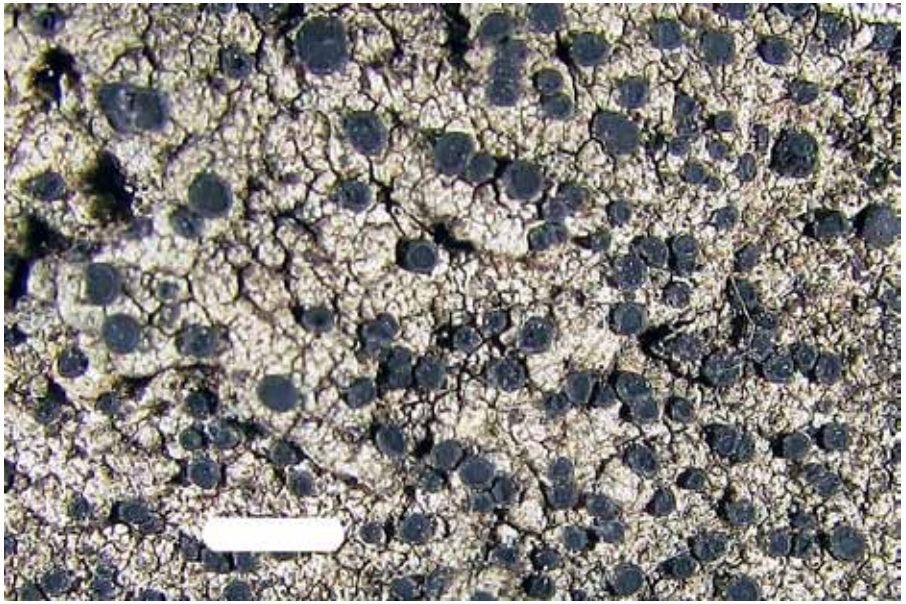


Figure 1. *Buellia subdisciformis* (H. Streimann 43912 in CANB). Scale = 2 mm.

Figure 2. *Rinodina ficta* (K. Kalb, *Lichenes Neotropici* 622 in CANB). Scale = 1 mm.

Barbara Polly (1932–2022)

Carol J. West
9 Mamari Street, Rongotai, Wellington 6022, New Zealand
e-mail: carolwest@xtra.co.nz

Jessica E. Beever
Manaaki Whenua Landcare Research,
231 Morrin Road, St Johns, Auckland 1072, New Zealand
e-mail: beeverj@landcareresearch.co.nz

Barbara Polly's contributions to lichenology began in July, 1989, in anticipation of a lichen workshop in November of that year, led by David Galloway and held at the Canterbury University Field Station at Cass. She somehow heard about the workshop, told some of her moss friends about it, bought the lichen *Flora* from the government printer (for $9.95), collected her first lichen specimens, and then began identifying them using the keys in the *Flora*. All of that happened in the space of 10 days! And the rest, as they say, is history (Fig. 1).

Barbara was born Barbara Mae West in Franklin, Ohio, USA, on 29 October, 1932. She gained a B.A. from California State University in 1966, and a year later became a registered teacher in English and history. She had lived in six states of the USA by 1970 when she emigrated from Los Angeles to Wellington, New Zealand, with her husband Don Polly and four children. The NZ Government sponsored the family's move, and Barbara began teaching at Porirua College. In the mid-1970s she worked in the Printing Department at Whitcoulls, then moved up the hill to the Victoria University of Wellington Printing Department, where she ran large photocopying machines.

Her botanical adventures began with native ferns in the late 1970s, when Patrick Brownsey taught evening classes on fern identification at Victoria University of Wellington for WEA (Workers Education Association). She quickly progressed from ferns to mosses (in the mid-1980s) and then to lichens (1989), which remained her passion for the rest of her life.

In 1987 she was made a Research Associate of Te Papa Tongarewa, giving her access to the herbarium and facilities in the Botany Department. When she retired in February, 1994, she typically was working four days per week at Te Papa as a volunteer, and occasionally was funded to undertake specific projects. She curated the lichen collections of William Colenso and Charles Knight, and identified and curated a collection of Antarctic lichens as well as working on her own collections. She also devoted a lot of time to tracking down specimens and reference material for colleagues.

Te Papa Herbarium (WELT) was the major recipient of Barbara's collections, particularly of lichens (Table 1). Her first specimens were mosses, collected from Keith George Memorial Park on 10 February, 1985, in the company of Rodney Lewington and Darea Sherratt. Her last specimens were lichens collected from Mana Island on 9 February, 2011, during a Bioblitz, again in the company of Rodney and Darea. Barbara's switch from mosses to lichens was quite definite: her first lichen collection that was accessioned was dated 5 August, 1989, (*Phaeographis mucronata* from Kay Conservation Covenant); her last moss accession was collected during a John Child Bryophyte Workshop on 24 November, 1989, (*Leptotheca gaudichaudii* from the Lammerlaw Range).

Several things enabled Barbara to become expert at moss and lichen collecting and identification. Firstly, her sharp intelligence and voracious reading appetite; secondly, the strong foundation of plant morphology and systematics taught in the WEA fern course by Patrick Brownsey; and thirdly, support from fellow botanists at the annual John Child Bryophyte Workshops, locally in Wellington but also from international experts. In addition, she had the advantage of visual short-sight, so she had only to push up her glasses without need for the constraints of a hand lens, a characteristic of many who have been successful in the study of small organisms.

Barbara attended almost every John Child Bryophyte workshop from 1985 to 2009. Her switching to collecting lichens broadened the scope of the workshop, and it is now referred to as the John Child Bryophyte and Lichen Workshop. In Wellington, Barbara was a key member of a group dubbed the Moss Mob (other core members were Patrick Brownsey, Rodney Lewington, Darea Sherratt and Barry Sneddon). This group initially met 2–3 times per month to identify their moss collections, but meetings were becoming more sporadic by the time the group wound up in December, 1992. Following the successful Moss Mob model of collaborative learning, Barbara set up a small group to study and identify lichens, dubbed the Lichen Lot. Core members were Barbara herself, Wendy Nelson and Carol West. The group met 1–2 times per month from December, 1989, to April, 1994.

As noted above, it was an upcoming lichen workshop that propelled Barbara into lichenology. She attended five lichen workshops from 1989 to 1998 and, in fact, organised the 1995 one held in Wellington. Two workshops held at Cass (1989, 1991) were led by David Galloway, and Barbara loved listening to his stories and learning from him and Jack Elix. Barbara's good friend Bill Malcolm organised two workshops based in Nelson (1991 and 1993), and in 1998 Jennifer Bannister organised a discussion and field meeting for Australasian lichenologists based in Dunedin that segued nicely into the annual John Child Bryophyte Workshop, also based in Dunedin. Barbara was always proud of the fact that botany had taken her to many places in New Zealand and even to Tasmania.

Lichen workshops provided valuable opportunities for Barbara to learn from local and international experts. She corresponded with a number of international lichenologists, and she appreciated the collaborations that resulted in the publication of new lichen records for New Zealand (see her full publications list below). She became expert in identification of crustose lichens, and took a particular interest in foliicolous lichens. In 1995, on a day trip to Kaitoke near Wellington, she collected a new species of *Strigula* on *Beilschmiedia tawa* (tawa) leaves which, with Emmanuël Sérusiaux, she named *Strigula kaitokensis* Sérusiaux & Polly.

Barbara particularly enjoyed passing on her knowledge and love of lichens. She would collect twigs covered in foliose, fruticose and crustose lichens to show to classrooms of students, and teach them basic lichen biology. She also led walks at Ōtari-Wilton's Bush looking at lichens and their habitats.

Having taken up lichenology in her late 50s, and while still working full time in an unrelated job, Barbara made a significant contribution to New Zealand lichenology. Her legacy is remembered in a commemorative seat installed in the Fernery at Ōtari-Wilton's Bush (Fig. 2), a place that she loved and collected lichens from. It is fitting that tawa leaves rain down on the seat, many of them no doubt hosting foliicolous lichens. It is also fitting that the seat overlooks the fernery, given that her journey as a botanist began with ferns.

Publications

Polly, B; Lewington, RJ (1989): Mosses of "Battle Hill Bush", Battle Hill Farm Forest Park, Paremata. *Wellington Botanical Society Bulletin* **45**, 120–124.

Elix, JA; Polly, B; Nelson, WA; West, CJ (1991): Additional lichen records from New Zealand. 5. *Parmelinopsis swinscowii* (Hale) Elix & Hale. *Australasian Lichenological Newsletter* **29**, 4.

Elix, JA; Polly, B (1992): Additional lichen records from New Zealand. 6. *Neofuscelia luteonotata. Australasian Lichenological Newsletter* **30**, 2–3.

Vězda, A; Lumbsch, HT; Nelson, WA; Polly, B; West, CJ (1992): Additional lichen records from New Zealand. 8. *Sarrameana septata* Aptroot & Sipman. *Australasian Lichenological Newsletter* **31**, 15–16.

Polly, B (1994): Additional lichen records from New Zealand. 11. *Arthonia radiata*. *Australasian Lichenological Newsletter* **35**, 18.

Lewington, RJ; Polly, B (1994): Mosses of the Wellington region. *Wellington Botanical Society Bulletin* **46**, 30–42.

Polly, B (1996): Additional lichen records from New Zealand. 20. *Arthonia vinosa, Heterodermia chilensis* and *Phacopsis oxyspora* var. *oxyspora. Australasian Lichenological Newsletter* **39**, 20–21.

Polly, B; West, CJ (1996): Kitchener Park then and now. *Wellington Botanical Society Bulletin* **47**, 59–62.

Sérusiaux, E; Polly, B (1996): *Strigula kaitokensis* sp. nov. from New Zealand. *Mycotaxon* **59**, 245–251.

Polly, B (1997): Additional lichen records from New Zealand. 25. *Calenia microcarpa* Vězda. *Australasian Lichenology* **41**, 8.

West, CJ; Polly, B (1999): Additional lichen records from New Zealand. 29. *Megalospora lopadioides* from Campbell Island. *Australasian Lichenology* **44**, 8.

Herbarium	Algae	Lichens	Mosses	Liverworts	Totals
AK		3	76	3	82
CANB		4	1		5
CHR		1	98	1	100
HO			8		8
OTA			4		4
WELT	5	2225	599	3	2832
Totals	5	2233	786	7	3031

Table 1. Number of specimens collected by Barbara Polly lodged in Australasian herbaria.

Fig. 1. Barbara Polly at Ōtari-Wilton's Bush. Photo: Dave Hansford.

Fig. 2. The plaque on the back of the commemorative seat installed in the Fernery at Ōtari-Wilton's Bush.

Azman, AA; Nadiah, N; Rosandy, AR; Alwi, A; Kamal, N; Khalid, RM; Bakar, MA (2021): Antimicrobial activity and lc-ms data comparison from lichen *Parmotrema praesorediosum* in Bangi, Selangor, Malaysia. *Sains Malaysiana* **50**(2), 383–393.

Bannister, JM; Knight, A; Blanchon, D (2023): Reinstatement of *Usnea capillacea* Motyka (lichenized Ascomycota, Parmeliaceae) to the New Zealand lichenized mycobiota. *Australasian Lichenology* **92**, 8–13.

Bishop, JM; Wasley, J; Waterman, MJ; Kohler, TJ; de Vijver, BV; Robinson, SA; Kopalová, K (2021[2020]): Diatom communities differ among Antarctic moss lichen vegetation types. *Antarctic Science* **33**(2), 118–132.

Casanovas, P; Black, M; Fretwell, P; Convey, P (2015): Mapping lichen distribution on the Antarctic Peninsula using remote sensing, lichen spectra and photographic documentation by citizen scientists. *Polar Research* **34**, 25633.

Elix, JA (2023): Two new species, a new combination and keys to the species of buellioid lichens (Caliciaceae, Ascomycota) in Antarctica. *Australasian Lichenology* **92**, 20–27.

Elix, JA (2023): Additional lichen records from Australia (**90**). New records of buellioid (Caliciaceae) and *Rinodina* species (Physciaceae). *Australasian Lichenology* **92**, 44–49.

Garrido-Benavent, I; Pérez-Ortega, S; de los Ríos, A; Mayrhofer, H; Fernández-Mendoza, F (2021[2020]): Neogene speciation and Pleistocene expansion of the genus *Pseudephebe* (Parmeliaceae, lichenized fungi) involving multiple colonizations of Antarctica. *Molecular Phylogenetics and Evolution* **155**, 107020.

Grzesiak, J; Woltyńska, A; Zdanowski, MK; Górniak, D; Świątecki, A; Olech, MA; Aleksandrzak-Piekarczyk, T (2021): Metabolic fingerprinting of the Antarctic cyanolichen *Leptogium puberulum*-associated bacterial community (Western Shore of Admiralty Bay, King George Island, Maritime Antarctica). *Microbial Ecology*: 10.1007/s00248-021-01701-2.

Kantvilas, G; Suija, A; Motiejünaité, J (2021): *Caloplaca tephromelae* (Teloschistaceae), a new lichenicolous species from Tasmania. *The Lichenologist* **53**(4), 317–325.

Kantvilas, G (2022): The genus *Lambiella* Hertel (lichenised fungi) in Tasmania: new combinations, new species and a revised key. *Phytotaxa* **549**(2), 209–218.

Kantvilas, G (2023): The remarkable *Lecidea hypersporella. Australasian Lichenology* **92**, 3–7.

McCarthy, PM (2023): *Fellhanera fasciculifera* (Pilocarpaceae), a new saxicolous lichen from southern New South Wales, with a key to the genus in Australia. *Australasian Lichenology* **92**, 14–19.

McCarthy, PM; Kantvilas, G (2023): A new species of *Porina* (lichenized Ascomycota, Porinaceae) from montane Tasmania, and an updated key to the saxicolous taxa in Australia. *Australasian Lichenology* **92**, 28–37.

McCarthy, PM (2023): Additional lichen records from New Zealand (**53**). *Australasian Lichenology* **92**, 38–43.

Roziaty, E; Sutarno; Suntoro, S; Sugiyarto (2020): Ecological indices on lichen biodiversity in three main different areas (the cities, countrysides and the forests Jogjakarta and Surakarta, Central Java, Indonesia. *Eurasian Journal of Biosciences* **14**(2), 4543–4550.

Sampe, DAF; Awuy, JM-D; Sekar, TKM; Wijaya, SF; Ananda, AZ; Marella, DT; Tampubolon, PM; Lestari, R (2020): Pilot study of air quality index assessment of nitrogen pollutant using lichen as bioindicators in Jakarta and Depok, Indonesia. *E3S Web of Conferences* **211**, 02014.

Sancho, L; de los Ríos, A; Pintado, A; Colesie, C; Raggio, J; Ascaso, C; Green, A (2020): *Himantormia lugubris*, an Antarctic endemic on the edge of the lichen symbiosis. *Symbiosis* **82**(1–2), 49–58.

Australasian Lichenology
Number 92, January 2023 ISSN 1328–4401

INFORMATION FOR SUBSCRIBERS

Australasian Lichenology is published twice a year. Each of those two issues by convention is called a Volume, and is numbered then dated either January or July of that year. Because of steadily rising printing and postage costs, copies are e-mailed to most subscribers as electronic .pdf files. Such files can be opened and read on either a PC or a Macintosh computer using Adobe's Acrobat® Reader (version 5.0 or later). From Adobe's website (www.adobe.com), you can download a free copy of Acrobat Reader that's compatible with your computer's operating system. An electronic journal offers the advantage of not only requiring no shelf space but also of being quickly searchable by computer. However, any subscriber who prefers hard-copies can print them out.

The journal is sent free to all electronic subscribers. To meet the requirement of the nomenclatural Code that printed descriptions of new taxa must be lodged in internationally recognized libraries and herbaria, a few selected library and herbaria suscribers will continue to get printed hard-copies.

If you wish to subscribe electronically, e-mail your request and your current e-mail address to the journal editor at <nancym@micro-opticspress.com> If you later change your e-mail address, be sure to inform the editor.

Volumes 58 and later can now be downloaded free from the website Recent Literature on Lichens (RLL). The directory is http://www.nhm.uio.no/botanisk/lav/RLL/AL/ Those same volumes plus searchable scans of Volumes 41–57 can be downloaded from http://www.anbg.gov.au/abrs/lichenlist/Australasian_Lichenology.html

INFORMATION FOR AUTHORS

Research papers submitted to *Australasian Lichenology* must be original and on some aspect of Australasian lichens or allied fungi, and they are refereed. The journal also welcomes newsworthy items on lichenologists who are either studying Australasian lichens or who are visiting the region.

The journal has no page charge, nor does it charge for colour plates. A manuscript can be e-mailed to W. Malcolm at <nancym@micro-opticspress.com> as (1) a file saved in "rich text format" (.rtf) *plus* (2) a cross-platform file saved in "portable document format" (.pdf). See a recent issue for a guide to text formatting and reference citations.

Drawings should be inked originals. They and photographs can be scanned at 600 dpi and then e-mailed as TIFF (.tif) or highest-quality JPEG (.jpg) files. In size they must be at least 1.5 MB.

Australasian Lichenology provides to authors free of charge an electronic off-print of each published paper, in the form of a .pdf file. Authors are free to make unlimited copies of that off-print.

Australasian Lichenology is the official publication of the Australasian Lichen Society, and formerly was named the *Australasian Lichenological Newsletter*. Its Editorial Board is W.M. Malcolm, J.A. Elix, P.M. McCarthy, A. Knight, G. Kantvilas, and S.H.J.J. Louwhoff.