



*Australasian Lichenology*  
 Number 77, July 2015 ISSN 1328-4401



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 Number 77, July 2015 ISSN 1328-4401

The cosmopolitan *Candelaria concolor* gets its distinctive yellow colour from pulvinic acid derivatives. Corticolous on introduced *Quercus*, *Populus*, and *Betula*, the species is widespread in public parks and gardens in Australia and New Zealand.

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Bush Blitz surveys of the flora and fauna in southern parts of the Australian Capital Territory and nearby New South Wales (December 2013) and the East Kimberley region of Western Australia (May/June 2014), co-funded by the Australian Government and BHP Billiton, resulted in the discovery of new lichen taxa and new national and otherwise interesting records (Archer & Elix 2014; McCarthy 2014; McCarthy & Elix 2014; Elix 2015). Here, three species collected during Bush Blitz surveys are confirmed from Australia for the first time; 25 others are newly reported for the A.C.T., N.S.W. and/or W.A.

### NEW RECORDS FOR AUSTRALIA

#### 1. *Aspicilia cinerea* (L.) Körb., *Syst. Lich. German.* 164 (1855)

Thallus pale greyish green or mid-grey to medium greenish brown, areolate, the areolae thin to rather thick, concave to plane, angular or irregular, usually uneven, K+ red (norstictic acid crystals visible in section), the thallus with or without a dark grey to blackish delimiting prothallus. Apothecia at first immersed in the thallus, with a black, concave to plane disc 0.4–1.4 mm wide. Mature apothecia becoming rather prominent and adnate with a thickish thalline margin. Ascospores simple, ellipsoid or broadly ellipsoid, (6–)8 per ascus, 15–22 8–14  $\mu\text{m}$ .

This lichen appears to be moderately common and even locally abundant on exposed siliceous rocks at subalpine and alpine elevations in south-eastern mainland Australia. Elsewhere, it is known from Eurasia, North and South America, Africa and New Zealand.

#### SELECTED SPECIMENS EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, Mt Scabby, summit area, 35°45'08"S, 148°54'35"E, alt. 1809 m, on exposed granite, *P.M. McCarthy* 4190, 4191 (*part*), 4192, 9.xii.2013 (CANB); • Scabby Lake, Mt Scabby, 35°44'26"S, 148°51'54"E, alt. 1598 m, on sheltered granite, *P.M. McCarthy* 4255, 12.xii.2013 (CANB); • below summit of Mt Bimberi, 35°39'27"S, 148°47'20"E, alt. 1882–1900 m, on granite, *P.M. McCarthy* 4256, 4263 (*part*), 4270 (*part*), 12.xii.2013 (CANB); • Mt Murray, summit area, 35°41'26"S, 148°47'35"E, alt. 1800–1850 m, on sheltered granite in *Eucalyptus pauciflora*-dominated forest-scrub, *P.M. McCarthy* 4291, 9.xii.2013 (CANB).

*New South Wales*: • Central Western Slopes, c. 13 km SW of Orange, Mt Canobolas, below summit, 33°20'40"S, 148°58'56"E, alt. c. 1390 m, on weathered volcanic outcrop on heath, with scattered *Eucalyptus* and *Acacia*, *P.M. McCarthy* 4322 (*part*), 1.iv.2014 (CANB).

#### 2. *Bilimbia sabuletorum* (Schreb.) Arnold, *Verhandl. Zool.-Bot. Ges. Wien* 19, 637 (1869) *Mycobilimbia sabuletorum* (Schreb.) Hafellner, *Beih. Nova Hedwigia* 79, 310 (1984)

Thallus crustose, diffuse and rather inconspicuous, coarsely granular or minutely warted, off-white to pale greenish grey, on tufted mosses overgrowing calcareous soil. Apothecia initially  $\pm$ plane, becoming strongly convex or subglobose, 0.3–0.8 mm diam., superficial, pale to dark brown or dull black, epruinose, the margin at first rather thick, entire and distinct, internally pale brown to hyaline, becoming recurved towards maturity and merging with the hypothecium; hymenium 70–90  $\mu\text{m}$  deep, amyloid (only the ascus walls), mainly hyaline but with vertical, olive to aeruginose streaks of pigment, K–, the paraphyses predominantly simple, 2–3  $\mu\text{m}$  wide, in a gelatinous matrix, gradually or abruptly broadening to 4–5  $\mu\text{m}$  wide apical cells that

lack pigmented caps; hypothecium 55–80 µm deep, dark olive-brown above, paler below, K–. Asci narrowly clavate or clavate-cylindrical, 8-spored, 65–72 10–13 µm; ascospores hyaline, 3–5(–7)-septate, fusiform, usually straight, 22–34 4.5–7.5 µm, the perispore usually not apparent.

This lichen grows on soil, peat, on living and moribund bryophytes or on soft calcareous rocks in North America, Europe, the South Shetland Islands, the Antarctic Peninsula, India and New Zealand.

#### SPECIMEN EXAMINED

*New South Wales*: • Mount Kosciuszko Natl Park, Blue Waterholes, cliff overlooking Caves Track, 35°37'35"S, 148°41'00"E, alt. 1186 m, on sheltered bryophytes growing on soil over limestone, *P.M. McCarthy 4235*, 11.xii.2013 (CANB).

### 3. *Caloplaca stillicidiorum* (Vahl) Lynge, *Kungl. Norske Vidensk. Selsk. Skr.* 1921(15), 4 (1921)

*Caloplaca cerina* var. *chloroleuca* (Sm.) Th.Fr., *Lichenogr. Scand.* 1, 174 (1871)

Thallus crustose, thin, diffuse, granular, pale to medium grey or pale greenish grey, on a hemispherical moss cushion growing directly on limestone. Apothecia superficial, 0.36–0.88 mm diam.; disc initially concave, becoming ±plane to slightly undulate-convex, deep orange to rusty orange, medium orange-brown or with a pronounced greenish hue; amphithecium containing algae, persistent, at first comparatively thick, entire or crenulate or radially fissured, pale to medium grey or pale bluish grey, becoming thinner, rather flexuose, but the colour scarcely changing. Ascospores narrowly to broadly ellipsoid, some broadly fusiform or almost citriform, (11–)12–18(–20) (5.5–)6–9(–10) µm ( $n = 40$ ); septum 4–8 µm thick.

This lichen is usually known from bryophytes and plant debris in northern-circumpolar regions, temperate and alpine Europe and North America, Macaronesia, North Africa and Central Asia. Although it was reported as the synonymous *C. cerina* var. *chloroleuca* from bryophytes in Nelson, New Zealand by Kondratyuk & Galloway (1994), that entity was later subsumed into a broadly circumscribed *C. cerina* (Ehrh.) Th.Fr., an exclusively bryophilous species in New Zealand (Galloway 2007).

The circumpolar to pantemperate *C. cerina* has sometimes been defined broadly to include *C. stillicidiorum* (Wetmore 2007; Galloway 2007). However, doubts have been raised regarding their relationship (Fletcher & Laundon 2009), and a recent molecular and morphological study of *C. cerina* and its allies distinguished the corticolous "*C. cerina* s. lat." from "*C. stillicidiorum* s. lat." on bryophytes, plant debris, the bark of roots, dwarf bushes and, rarely, on rock (Loun *et al.* 2011), a conclusion endorsed by McCune (2012). That distinction is followed here and is supported by the fact that corticolous *C. cerina* in the southern A.C.T. (see below) usually has darker and greener thalli and amphithecia, as well as smaller ascospores [(10–)11–14(–15) 4.5–6 µm ( $n = 30$ )] with a septum (3–)3.5–5 µm thick.

#### SPECIMEN EXAMINED

*New South Wales*: • Mount Kosciuszko Natl Park, Blue Waterholes, cliff overlooking Caves Track, 35°37'35"S, 148°41'00"E, alt. 1186 m, on grimmoid moss cushion growing on limestone, *P.M. McCarthy 4243 (part)*, 11.xii.2013 (CANB).

#### NEW STATE AND TERRITORY RECORDS

##### 1. *Acarospora veronensis* A.Massal., *Ric. Auton. Lich. Crost.* 29 (1852)

In Australia this mainly saxicolous species was previously known only from Tasmania (McCarthy 2015). It also occurs in North America, Europe, Central Asia, New Zealand and Antarctica.

#### SPECIMENS EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, entrance to Glendale Depot,

35°41'24"S, 149°00'21"E, alt. 876 m, on wooden sign-post, *P.M. McCarthy 4206 part*, 8.xii.2013 (CANB) [Det. J.A. Elix].

*New South Wales*: • Central Western Slopes, W face of Mt Canobolas, c. 13 km SW of Orange, 33°12'17"S, 148°58'37"E, alt. 1250 m, on weathered volcanic outcrop below summit, *P.M. McCarthy 4320*, 1.iv.2014 (CANB).

##### 2. *Bilimbia lobulata* (Sommerf.) Hafellner & Coppins, *in Veldkamp, Lichenologist* 36, 195 (2004)

Known from Victoria and Tasmania (McCarthy 2015), this lichen also occurs in Europe, North America, New Zealand and Antarctica.

#### SPECIMEN EXAMINED

*New South Wales*: • Mount Kosciuszko Natl Park, Blue Waterholes, cliff overlooking Caves Track, 35°37'35"S, 148°41'00"E, alt. 1186 m, on bryophytes growing on sheltered limestone, *P.M. McCarthy 4308*, 11.xii.2013 (CANB) [Det. G. Kantvilas].

##### 3. *Caloplaca cerina* (Ehrh.) Th.Fr., *Lich. Arct.* 118 (1860)

A pantemperate to boreal species previously known from Western Australia and South Australia, *C. cerina* is part of a small but very distinctive lichen community on and below mountain-tops in the southern A.C.T. These lichens grow on the narrow twigs of stunted and wind-swept snowgums (*Eucalyptus pauciflora*, Fig. 1) in a community dominated by *Lecidella* spp., *Ramboldia* spp., *Caloplaca wilsonii* S.Y. Kondr. & Kärnefelt and *Candelariella xanthostigma* (Ach.) Leftau (Table 1).

#### SELECTED SPECIMENS EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, Mt Ginini, scree slope, 35°31'47"S, 148°46'41"E, alt. 1665 m, on twigs of *Eucalyptus*, *P.M. McCarthy 4193 (part)*, 10.xii.2013 (CANB); • below summit of Mt Bimberi, 35°39'27"S, 148°47'20"E, alt. 1882–1900 m, on twigs of *Eucalyptus pauciflora*, *P.M. McCarthy 4148 (part)*, 4149, 12.xii.2013 (CANB).

##### 4. *Caloplaca cerinella* (Nyl.) Flagey, *in Battandier & Trabut, Fl. Algérie* 2(1): 31 (1896)

Previously reported from Tasmania (McCarthy 2015), this lichen is also known from Europe, North Africa, India and New Zealand.

#### SPECIMEN EXAMINED

*New South Wales*: • Mount Kosciuszko Natl Park, Blue Waterholes, rocky knoll overlooking Nichols Gorge Track, 35°37'35"S, 148°41'03"E, alt. 1210 m, on twigs of *Eucalyptus stellulata*, *P.M. McCarthy 4276 (part)*, 4278, 11.xii.2013 (CANB).

##### 5. *Caloplaca flavorubescens* (Huds.) J.R. Laundon, *Lichenologist* 8, 147 (1976)

Known from Western Australia, South Australia, Queensland, New South Wales, Victoria, Tasmania and Norfolk Island (McCarthy 2015), this corticolous lichen also occurs in North America, Europe, Iran, China and New Zealand.

#### SPECIMEN EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, below summit of Mt Bimberi, 35°39'27"S, 148°47'20"E, alt. 1882–1900 m, on twigs of *Eucalyptus pauciflora*, *P.M. McCarthy 4148 (part)*, 12.xii.2013 (CANB).

##### 6. *Circinaria caesiocinerea* (Nyl. ex Malbr.) A.Nordin, S.Savic & Tibell, *Mycologia* 102, 1341 (2010)

*Aspicilia caesiocinerea* (Nyl. ex Malbr.) Arnold, *Verh. K.K. Zool.-Bot. Ges. Wien*, B, 36, 67 (1886)

In Australia this saxicolous lichen is currently known only from Victoria (McCarthy 2015). It is common in much of the Northern Hemisphere. Also known in South America and New Zealand.

#### SELECTED SPECIMENS EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, Mt Ginini, 35°31'47"S, 148°46'41"E, alt. 1665 m, on sheltered granite of scree slope, *P.M. McCarthy 4188 (part)*, 4212, 10.xii.2013 (CANB); • Mt Scabby summit, 35°45'08"S, 148°54'35"E, alt. 1809 m, on exposed granite, *P.M. McCarthy 4248*, 9.xii.2013 (CANB).

*New South Wales*: • Central Western Slopes, W face of Mt Canobolas, c. 13 km SW of Orange, 33°12'17"S, 148°58'37"E, alt. 1250 m, on weathered volcanic outcrop below summit, *P.M. McCarthy 4328*, 1.iv.2014 (CANB).

#### 7. *Cladonia mitis* Sandst., *Cladon. Exsicc.* [55] (1918)

Occurs in New South Wales, Victoria and Tasmania (McCarthy 2015), and is also known from northern Eurasia, North America, southern South America, New Zealand and Antarctica.

#### SPECIMEN EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, Sentry Box Mtn, summit, 35°49'34"S, 148°54'11"E, alt. 1720 m, on shallow peat, *P.M. McCarthy 4118*, 9.xii.2013 (CANB).

#### 8. *Lecanora saligna* (Schrad.) Zahlbr., *Cat. Lich. Univ.* 5, 536 (1928)

The distribution of this predominantly pantemperate species includes South Australia, Queensland and Tasmania (McCarthy 2015).

#### SPECIMEN EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, Booroomba Rocks track, c. 150 m from cliff-top, 35°33'27"S, 148°59'32"E, alt. 1337 m, on trunk of felled *Eucalyptus dalrympleana*, *P.M. McCarthy 4216 (part)*, 12.xii.2013 (CANB) [Det. G. Kantvilas].

#### 9. *Lecidea diducens* Nyl., *Flora* 48, 148 (1865)

Occurs in New South Wales, Victoria and Tasmania (McCarthy 2015), and also in the Arctic, Eurasia, North America, southern South America and New Zealand.

#### SELECTED SPECIMENS EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, Mt Scabby, summit area, 35°45'08"S, 148°54'35"E, alt. 1809 m, on exposed granite, *P.M. McCarthy 4191*, 9.xii.2013 (CANB); • Scabby Lake, Mt Scabby, 35°44'26"S, 148°51'54"E, alt. 1598 m, on sheltered granite, *P.M. McCarthy 4254 (part)*, 9.xii.2013 (CANB); • Sentry Box Mtn, summit, 35°49'34"S, 148°54'11"E, alt. 1720 m, on sheltered granite, *P.M. McCarthy 4104*, 9.xii.2013 (CANB); • Mt Bimberi, below summit, 35°39'27"S, 148°47'20"E, alt. 1882–1900 m, on granite, *P.M. McCarthy 4259*, 9.xii.2013 (CANB).

#### 10. *Lecidella destituta* Kantvilas & Elix, *Muelleria* 31, 32 (2013)

A recently described endemic species, this lichen was known from Western Australia, South Australia, New South Wales and Tasmania (Kantvilas & Elix 2013).

#### SELECTED SPECIMENS EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, Mt Murray, summit area, 35°49'34"S, 148°54'11"E, alt. 1800–1850 m, on narrow twigs of *Eucalyptus pauciflora*, *P.M. McCarthy 4151*, 9.xii.2013 (CANB) [Det. G. Kantvilas]; • scree slope, Mt Ginini, 35°31'47"S, 148°46'41"E, alt. 1665 m, on twigs of *Eucalyptus*, *P.M. McCarthy 4194 (part)*, 4195, 4205 (*part*), 10.xii.2013 (CANB); • Booroomba Rocks track, c. 150 m from cliff-top, 35°33'27"S, 148°59'32"E, alt. 1337 m, on trunk of felled *Eucalyptus dalrympleana*, *P.M. McCarthy 4216 (part)*, 12.xii.2013 (CANB) [Det. G. Kantvilas].

#### 11. *Menegazzia confusa* P. James, in Kantvilas & James, *Lichenologist* 19, 26 (1987)

This endemic lichen grows on bark and wood in upland and montane forest in south-eastern New South Wales, southern Victoria and Tasmania (James & Gallo-way 1994).

#### SPECIMEN EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, Mt Murray, summit area, 35°49'34"S, 148°54'11"E, alt. 1800–1850 m, on twigs of *Tasmania xerophila*, *P.M. McCarthy 4152*, 9.xii.2013 (CANB).

#### 12. *Micarea prasina* Fr., *Syst. Orb. Veg.* 256 (1825)

This almost cosmopolitan species grows on bark, wood, plant debris and soil. It occurs in Queensland, Victoria and Tasmania.

#### SELECTED SPECIMENS EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, Booroomba Rocks Track, c. 150 m from cliff-top, 35°33'27"S, 148°59'32"E, alt. 1337 m, on trunk of felled *Eucalyptus dalrympleana*, *P.M. McCarthy 4213*, 4214 (*part*), 4215 (*part*), 12.xii.2013 (CANB); • Booroomba Rocks Track, 35°33'57"S, 148°59'36"E, alt. 1169 m, on trunk of felled *Eucalyptus dalrympleana*, *P.M. McCarthy 4220*, 12.xii.2013 (CANB).

#### 13. *Monerolechia badia* (Fr.) Kalb, *Biblioth. Lichenol.* 88, 312 (2004)

The distribution of this cosmopolitan lichen includes Western Australia, Queensland, New South Wales, Tasmania and Lord Howe Island (Elix 2011a, 2015).

#### SPECIMENS EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, Mt Murray, summit area, 35°41'26"S, 148°47'35"E, alt. 1800–1850 m, on exposed granite in *Eucalyptus pauciflora*-dominated forest-scrub, *P.M. McCarthy 4124*, 4173, 9.xii.2013 (CANB).

#### 14. *Myriospora smaragdula* (Wahlenb. ex Ach.) Nägeli ex Uloth, *Flora* 44, 618 (1861)

*Acarospora smaragdula* (Wahlenb. ex Ach.) A. Massal., *Ric. Auton. Lich. Crost.* 29 (1852)

Although this lichen is almost cosmopolitan in its global distribution, locally it has only been reported from Western Australia and South Australia (McCarthy 2015).

#### SPECIMEN EXAMINED

*Australian Capital Territory*: • Canberra, c. 4 km NNW of Capital Hill, Australian National Botanic Gardens, Section 186, on sandstone edging a road, *P.M. McCarthy 4475*, 31.iii.2015 (CANB).

#### 15. *Pertusaria erubescens* (Taylor) Nyl., *Mém. Soc. Sci. Nat. Cherbourg* 5, 117 ('1857') [1858]

A montane, silicolous lichen in the south of Western Australia, New South Wales and Victoria (Archer 2012; McCarthy 2015). Also known from southern South America, the Falkland Islands, South Africa, New Zealand and Antarctica.

#### SPECIMEN EXAMINED

*Australian Capital Territory*: • Namadgi Natl Park, Mt Ginini, 35°31'47"S, 148°46'41"E, alt. 1665 m, on sheltered granite in scree slope, *P.M. McCarthy 4180*, 9.xii.2013 (CANB).

#### 16. *Protoblastenia rupestris* (Scop.) J. Steiner, *Verh. K.K. Zool.-Bot. Ges. Wien*, B, 61, 47 (1911)

This is a common, limestone-inhabiting lichen in temperate to boreal regions of the Northern Hemisphere, including North America, Europe, Macaronesia, Central Asia and Japan. It also occurs in New Zealand and Tasmania (McCarthy 2015).

#### SPECIMENS EXAMINED

*New South Wales*: • Mount Kosciuszko Natl Park, Blue Waterholes, cliff overlooking Caves Track, 35°37'35"S, 148°41'00"E, alt. 1186 m, on sheltered limestone, *P.M. McCarthy 4170*, 4245 (*part*), 11.xii.2013 (CANB); • *loc. id.*, rocky knoll overlooking Nichols Gorge Track, 35°37'35"S, 148°41'03"E, alt. 1210 m, on exposed limestone, *P.M. McCarthy 4305*, 11.xii.2013 (CANB).

**17. *Protoparmelia pulchra*** Diederich, Aptroot & Sérus., in Aptroot et al., *Biblioth. Lichenol.* **64**, 147 (1997)

This lichen, originally described from montane forest in Papua New Guinea, is also known from Western Australia, the Northern Territory, Queensland, New South Wales and Tasmania (McCarthy 2015).

**SPECIMEN EXAMINED**

*Australian Capital Territory*: • Namadgi Natl Park, Mt Scabby, summit area, Namadgi Natl Park, A.C.T., 35°45'08"S, 148°54'35"E, alt. 1809 m, on twigs of *Eucalyptus pauciflora*, *P.M. McCarthy 4199 (part)*, 9.xii.2013 (CANB).

**18. *Pyxine microspora*** Vain., *Philipp. J. Sci.*, Sect. C, 8, 110 (1913)

This species grows on rock in coastal and hinterland forest in the Northern Territory and eastern Qld (Elix 2011b). Also known from South America, Africa, southern and eastern Asia and the central Pacific Ocean.

**SPECIMEN EXAMINED**

*Western Australia*: • East Kimberley, Durack River Property, c. 42 km due S of Gibb River Road, near tributary of Horse Creek, gorge walls [Site P23], 16°13'03"S, 127°30'53"E, alt. c. 450 m, on sheltered sandstone, *P.M. McCarthy 4474 (part)*, 28.v.2014 (PERTH) [Det. J.A. Elix].

**19. *Rinodina ramboldii*** Kaschik, *Biblioth. Lichenol.* **93**, 105 (2006)

In Australia this species is known from the Northern Territory, South Australia, Queensland and Victoria (Elix 2011c; McCarthy 2015). It also occurs on the Juan Fernandez Islands in the south-eastern Pacific Ocean.

**SPECIMEN EXAMINED**

*Western Australia*: • East Kimberley, Durack River Property, c. 90 km due S of Gibb River Road, near tributary of Chamberlain River [Site P2], 16°37'08"S, 127°31'48"E, alt. c. 510 m, on sheltered sandstone, *P.M. McCarthy 4464 (coll. A. Rao, R. Butcher & A. Start)*, 31.v.2014 (PERTH) [Det. J.A. Elix].

**20. *Scoliciosporum umbrinum*** (Ach.) Arnold, *Flora* **54**, 50 (1871)

A warm-temperate to circumpolar species in the Northern Hemisphere, this lichen also occurs in New Zealand, islands in the Indian Ocean, as well as New South Wales and Tasmania (McCarthy 2015).

**SELECTED SPECIMENS EXAMINED**

*Australian Capital Territory*: • Namadgi Natl Park, Mt Scabby, summit area, 35°45'08"S, 148°54'35"E, alt. 1809 m, on twigs of *Eucalyptus pauciflora*, *P.M. McCarthy 4199*, 9.xii.2013 (CANB); • Mt Murray, summit area, 35°41'26"S, 148°47'35"E, alt. 1800–1850 m, on exposed granite in *Eucalyptus pauciflora*-dominated forest-scrub, *P.M. McCarthy 4176 (part)*, 9.xii.2013 (CANB); • Mt Ginini, 35°31'47"S, 148°46'41"E, alt. 1665 m, on twigs of *Eucalyptus* in scree slope, *P.M. McCarthy 4197*, 10.xii.2013 (CANB).

**21. *Thelenella brasiliensis*** (Müll.Arg.) Vain., *J. Bot.* **34**, 293 (1896)

This inconspicuous pyrenolichen of siliceous rocks occurs in Brazil, Central America, the Caribbean, West Africa, southern Africa and China (Mayrhofer 1987), as well as Christmas Island and eastern Queensland (McCarthy 2015).

**SPECIMENS EXAMINED**

*Western Australia*: • East Kimberley, Durack River Property, c. 42 km due S of Gibb River Road, near tributary of Horse Creek, gorge walls [Site P23], 16°13'03"S, 127°30'53"E, alt. c. 400 m, on sheltered sandstone, *P.M. McCarthy 4474 (part)*, 28.v.2014 (PERTH); • c. 40 km due S of Gibb River Road, tributary of Horse Creek, crater and gorge walls [Site P24], 16°12'17"S, 127°29'48"E, alt. c. 450 m, on sheltered sandstone,

*P.M. McCarthy 4468*, 2.vi.2014 (PERTH).

**22. *Thelenella luridella*** (Nyl.) H.Mayrhofer, *Biblioth. Lichenol.* **26**, 45 (1987)

This lichen is known from South and Central America, the Caribbean, U.S.A. (Florida), Algeria, southern Africa, the Arabian Peninsula, Japan, New Zealand and Queensland (Mayrhofer 1987).

**SPECIMEN EXAMINED**

*New South Wales*: • Central Western Slopes, Goobang Natl Park, c. 25 km E of Peak Hill, 32°49'58"S, 148°20'12"E, alt. 440 m, on damp, deeply shaded metamorphosed sandstone along bank of seasonal stream in *Eucalyptus-Callitris* woodland, *P.M. McCarthy 4324*, 2.iv.2014 (CANB).

**23. *Trapelia crystallifera*** Kantvilas & Elix, *Biblioth. Lichenol.* **95**, 324 (2007)

This endemic lichen was already known from Western Australia, South Australia, New South Wales, Victoria and Tasmania (Kantvilas & Elix 2007; McCarthy 2015).

**SPECIMEN EXAMINED**

*Australian Capital Territory*: • Namadgi Natl Park, Brandy Flat Fire Trail, c. 1.5 km NE of Glendale Depot, 35°41'42"S, 149°01'04"E, alt. 995 m, on granitic soil in bank of road-cutting through sparse eucalypt-dominated forest, *P.M. McCarthy 4107*, 13. xii. 2013 (CANB) [Det. J.A. Elix].

**24. *Usnea pycnoclada*** Vain., *Philipp. J. Sci.*, Sect. C, 4, 653 (1909)

Known from Papua New Guinea, the Philippines, Taiwan, Queensland, New South Wales, Victoria and Tasmania (McCarthy 2015).

**SELECTED SPECIMENS EXAMINED**

*Australian Capital Territory*: • Namadgi Natl Park, Mt Ginini, scree slope, 35°31'47"S, 148°46'41"E, alt. 1665 m, on twigs of *Eucalyptus*, *P.M. McCarthy 4193 (part)*, 10.xii.2013 (CANB); • below summit of Mt Bimberi, 35°39'27"S, 148°47'20"E, alt. 1882–1900 m, on branches of *Eucalyptus pauciflora*, *P.M. McCarthy 4172*, 12.xii.2013 (CANB).

**25. *Xanthoparmelia subcrustulosa*** (Elix) O.Blanco, A.Crespo, Elix, D.Hawksw. & Lumbsch, *Taxon* **53**, 971 (2004)

*Neofuscelia subcrustulosa* Elix, *Mycotaxon* **71**, 450 (1999)

This rather inconspicuous endemic lichen was already known from Western Australia and South Australia (Elix 1999).

**SPECIMEN EXAMINED**

*New South Wales*: • Central Western Slopes, W face of Mt Canobolas, c. 13 km SW of Orange, 33°12'17"S, 148°58'37"E, alt. 1250 m, on weathered volcanic outcrop, *P.M. McCarthy 4330*, 1.iv.2014 (CANB) [Det. J.A. Elix].

**Acknowledgements**

I am grateful to Jack Elix and Gintaras Kantvilas for help with the identification of specimens.

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Figure 1. Snowgums near the summit of Mount Bimberri, A.C.T. (c. 1800 m alt.).

Table 1. Lichens on 5–10 mm diameter twigs of snowgum (*Eucalyptus pauciflora*) at elevations of 1600–1900 m in Namadgi National Park, A.C.T.

<i>Amandinea punctata</i>	<i>Lecidella destituta</i>	<i>Protoparmelia pulchra</i>
<i>Baculifera xylophila</i>	<i>Lecidella elaeochroma</i>	<i>Ramboldia laeta</i>
<i>Caloplaca cerina</i>	<i>Lecidella xylogena</i>	<i>Ramboldia stuartii</i>
<i>Caloplaca flavorubescens</i>	<i>Lecidella</i> sp.	<i>Ramboldia subnexa</i>
<i>Caloplaca wilsonii</i>	<i>Menegazzia platytrema</i>	<i>Scoliciosporum umbrinum</i>
<i>Candelariella xanthostigma</i>	<i>Micarea</i> aff. <i>lignaria</i>	<i>Usnea inermis</i>
<i>Hypogymnia lugubris</i>	<i>Pertusaria pertractata</i>	<i>Usnea pycnoclada</i>

## Additional lichen records from Australia 82. Queensland

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### Abstract

*Dirinaria leopoldii* (Stein) D.D.Awasthi is reported for the first time from Australia, and 28 other species are listed as new records for Queensland.

### Introduction

About half of Australia's known lichen species occur in Queensland. The Queensland Herbarium (BRI) is nearly 150 years old, and holds significant lichen collections. Recent BRI acquisitions include species previously unknown from Queensland, and some previously unidentified or misidentified collections have proved to be species not yet reported from Queensland. AQ numbers (Acquisition Queensland) link to records on the BRI database, and allow full recovery of collection details. BRI numbers are now discontinued.

### New record for Australia

#### 1. *Dirinaria leopoldii* (Stein) D.D.Awasthi, *Biblioth. Lichenol.* 2, 89 (1975)

This species is also known from East Africa, India, Brazil, the southern U.S.A. and the Galápagos Islands.

Thallus foliose, up to 50 mm diameter, lobes white to grey or pink colouration from the medulla showing through the cortex; up to 1 mm wide; sorediate, soralia laminal, capitate; medulla with red pigment in the upper part, ochraceous below; lower cortex black. Apothecia not known. Cortex K+ yellow; medulla K+ purple. Atranorin, triterpenoids, red K+ purple pigment, ochraceous K+ purple pigment, ± sekikaic acid derivative.

*Dirinaria leopoldii* is characterized by a pink to red medulla with a lower ochraceous band, but no white layer, and laminal capitate soralia (Swinscow & Krog 1975). The medulla of the other species of *Dirinaria* occurring in Australia is unpigmented except for *D. sekikaica* Elix, which has a medulla that is rarely orange toward the lobe tips.

### SPECIMEN EXAMINED

*Queensland*: • roadside 1 km W of Goomeri, 26°10'29"S, 152°03'03"E, on bark of roadside tree in mown verge, *R.W. Rogers 12314 & T.E. Albone*, 27.vi.2014 (BN864735).

### New records for Queensland

Unless otherwise indicated, the distribution data within Australia are taken from McCarthy (2014)

#### 1. *Candelariella aurella* (Hoffm.) Zahlbr., *Cat. Lich. Univ.* 5, 790 (1928)

A widely distributed and perhaps cosmopolitan species, on rock, previously reported from South Australia, New South Wales, the Australian Capital Territory, Victoria and Tasmania.

### SPECIMENS EXAMINED

*Queensland*: • 20 km W of Vergemont H.S. (c. 130 km W of Longreach), site 339, 23°30'S, 142°28'E, residual plateau, open shrubland, *V.J. Neldner & T.D. Stanley s.n.*, iv.1986 (AQ 716630); • Salvator Rosa National Park, 24°30'S, 147°30'E, on sandstone, *M.E. Ballingall 1013*, 30.iii.1983 (AQ 694311); • Idalia National Park, near Old Idalia, 24°53'S, 144°43'E, *R.W. Rogers 10466*, viii.1997 (AQ 690645); • Round Mountain, 27°46'S, 152°57'E, on sandstone in *E. crebra*-*E. citriodora* woodland at forest margin, *R.W. Rogers 10612*, 4.ii.2004 (AQ 646719).

2. *Candelariella xanthostigmoides* (Müll.Arg.) R.W.Rogers, *Muelleria* 5, 32 (1982)  
An Australian endemic known from bark in Western Australia, the Northern Territory, South Australia, New South Wales, the Australian Capital Territory, Victoria and Tasmania.

### SPECIMEN EXAMINED

*Queensland*: • Matingara St, Chapel Hill, 27°29'31"S, 152°57'01"E, trunk of *Roystonea* regia in suburban garden, *R.W. Rogers s.n.*, 03.vii.2006 (AQ 699879).

#### 3. *Collema coccophorum* Tuck., *Proc. Amer. Acad. Arts* 5, 385 (1862)

Cosmopolitan on arid zone soils, including locations in Western Australia, South Australia, Victoria, Tasmania, New South Wales and the Northern Territory.

### SELECTED SPECIMENS EXAMINED

*Queensland*: • GiGi Paddock, Mt Margaret Station, 30 km SW of Eromanga, study site 4, 3.7 km from Poison Tank, 26°47'S, 143°24'E, *M.E. Tozer & M.G. Tozer s.n.*, 21.x.1995 (AQ 685526); • Eight Mile Paddock, Thylungra Station, 100 km NW of Quilpie, Study site 3, 2.14 km from McGrath's Bore, 25°55'S, 143°19'E, *M.E. Tozer & M.G. Tozer s.n.*, 18.x.1995 (AQ 716837); • Idalia National Park, about 5 km W of homestead, 24°51'S, 144°41'E, on soil, *R.W. Rogers 10470*, viii.1998 (AQ 647625); • c. 50 km W of Morvern, 26°26'44"S, 147°31'03"E, on soil in poplar box woodland, *R.W. Rogers 10736*, 23.vii.2004 (AQ 648483); • Woodland 4 km E of Goondiwindi, 28°29'S, 150°21'35"E, on soil in poplar box, *R.W. Rogers 10785*, 23.ix.2004 (AQ 648486).

#### 4. *Diploschistes euganeus* (A.Massal.) J.Steiner, *Verh. Zool.-Bot. Ges. Wien* 69, 96 (1919)

Subcosmopolitan, widely distributed on exposed acid rocks in Western Australia, South Australia, New South Wales and the Australian Capital Territory.

### SPECIMENS EXAMINED

*Queensland*: • 95 km W of Windorah, 9 km NNW of Canterbury, 25°20'S, 141°50'E, tall open shrubland of *Acacia shirleyi* and *A. aneura*, on rock, *V.J. Neldner 4410*, 18.v.2008 (AQ 792382); • Auburn State Forest, 18 km WSW of Mundubbera, 25°38'31"S, 151°7'33"E, woodland of *Corymbia citriodora* on sandstone outcrop, *P.I. Forster 39049*, 30.viii.2009 (AQ 818947); • Road to Blackdown Tableland (State Forest 175), 30 km SE of Blackwater, 23°45'S, 149°07'E, 600 m alt., dry sclerophyll forest above escarpment, on semi-exposed boulder, *H. Streimann 52250*, 22.viii.1993 (AQ 696191).

#### 5. *Diploschistes thunbergianus* Lumbsch & Vězda, *Nova Hedwigia* 56, 234 (1993)

Cosmopolitan on dry or semi-arid soil in Western Australia, South Australia, Victoria, Tasmania, New South Wales, the Australian Capital Territory and the Northern Territory.

### SPECIMENS EXAMINED

*Queensland*: • Idalia National Park, near Old Idalia HS, on seasonally waterlogged soil, bare soil in very sparse shrubland, 24°5'S, 144°4'E, *R.W. Rogers 10471*, 1997 (AQ 647626); • Glenlyon Rd near Glenlyon Dam, 27.492°S, 152.925°E, on eroded soil, *R.W. Rogers 11422*, 21.01.2008 (AQ 752428).

#### 6. *Hyperphyscia isidiata* Moberg, *Nordic J. Bot.* 7, 722 (1987)

Occurs on bark in East Africa, Angola, Costa Rica and Australia, previously known in Australia from western New South Wales.

### SPECIMEN EXAMINED

*Queensland*: • beside Warrego Highway, about 32 km W of Mitchell, 26°48'47"S, 147°40'18"E, on bark of *Pouteria continifolius* on a dry ridge top, *R.W. Rogers 12213*, 25.xi.2012 (AQ 863789).

7. **Jackelisia elixii** (S.Y.Kondr. & Kärnefelt) S.Y.Kondr., Fedorenko, S.Stenroos, Kärnefelt & A.Thell, in Fedorenko *et al.*, *Biblioth. Lichenol.* **100**, 77 (2009)

An Australian endemic, widely distributed in southern Australia, previously reported from Western Australia, South Australia, New South Wales, the Australian Capital Territory, Victoria and Tasmania.

SPECIMEN EXAMINED

*Queensland*: • Point Lookout, North Stradbroke Island, rocks S of the surf club-house, 27°25'S, 153°32'E, facing S, on rocks with seepage, *R.W. Rogers* 2997, 20.viii.1984 (AQ 694542).

8. **Menegazzia conica** P.James, in James & Galloway, *Fl. Australia* **54**, 312 (1992)

Previously known only from twigs and bark of rainforest trees in north-eastern New South Wales.

SPECIMEN EXAMINED

*Queensland*: • Springbrook Plateau, on track to "Best of All Lookout", in rainforest on cliff edge 28°14'S, 153°15'E, 1600 m alt., *G.N. Stevens* 4257, 7.x.1983 (AQ 6892236).

9. **Menegazzia enteroxantha** (Müll.Arg.) R.Sant., *Ark. Bot.* **30A**(11), 12 (1942)

Previously known only from rainforest canopies in north-eastern New South Wales.

SPECIMEN EXAMINED

*Queensland*: • "3 Mile Gulley", W branch of Canungra Creek, Lamington National Park, fallen branches in temperate rainforest, 28°15'S, 153°10'E, 1010 m alt., *P.Merrotzky s.n.*, 28.i.1986 (AQ 689213).

10. **Menegazzia platytrema** (Müll.Arg.) R.Sant., *Ark. Bot.* **30A**(11), 13 (1942)

Widespread on bark and twigs in moister areas in southern Australia, previously reported from Western Australia, Victoria, Tasmania, the Australian Capital Territory and New South Wales.

SPECIMENS EXAMINED

*Queensland*: • Southern Moreton Bay, in mangrove-covered island, 27°50'S, 131°1'E, on *Ceriops tagal* twig, *G.N. Stevens* 2500, 12.vi.1978 (AQ 689235); • Border Track, 5 km from O'Reilly's Guest House, Lamington National Park, 28°15'S, 153°08'E, 1000 m alt., *R.W. Rogers* 8015 & *P. Merrotzky*, 28.i.1986 (AQ 689213).

11. **Notoparmelia cunninghamii** (Cromb.) A.Crespo, Ferencova & Divakar, *Lichenologist* **46**, 63 (2014)

A species of cool southern land masses including South America and New Zealand; also Western Australia, South Australia, New South Wales, Victoria and Tasmania.

SPECIMENS EXAMINED

*Queensland*: • 8 km E of Mt Mowbull, Bunya Mtns, 26°5'S, 151°3'E, bark of tree in low roadside scrub, c. 600 m alt., *R.W. Rogers* 8981 & *K. Kalb*, 15.viii.1988 (AQ 690608); • State Forest 1667 approx. 5 km from Hampton on left of road 27°53'S, 152°04'E, *M.E. Ballingall* & *G.R. Scott s.n.*, 3.iii.1985 (AQ 691708).

12. **Notoparmelia pseudotenuirima** (Gyeln.) A.Crespo, Ferencova & Divakar, *Lichenologist* **46**, 63 (2014)

An Australian endemic previously found on wood and bark in Western Australia, South Australia, Victoria and New South Wales.

SPECIMENS EXAMINED

*Queensland*: • Donnybrook, c. 25 km N of Brisbane, 27°00'S, 153°03'E, on bark of fig tree near mangroves, *R.W. Rogers* 1951, 26.i.1972 (AQ 690529); • Kremlow Rd, Strath-

pine, 27°17'S, 152°59'E, on bark of *Ficus*, *R.W. Rogers* 6384 & *C. Scarlett*, no date (AQ 6905320); • Springbrook-Numinbah-Nerang intersection, 28°07'S, 153°15'E, on shaded rocks in the bed of the Nerang River, *R.W. Rogers* 2965, no date (AQ 690530); • Girraween National Park, Castle Rock track, woodland of *Eucalyptus youmanii*, on branches of young *Callitris*, *P.I. Forster* 34986, no date (AQ 813439).

13. **Peltula radicata** Nyl., *Ann. Sci. Nat. Bot.*, sér. 3, **20**, 316 (1853)

Known from soils in Africa, Asia and North America, with previous Australian records from Western Australia and South Australia.

SPECIMEN EXAMINED

*Queensland*: • Summit of Grey Range, 26°37'40"S, 143°57'00"E, on soil in arid woodland, *R.W. Rogers* 10716, 24.vii.2004 (AQ 648585).

14. **Peltula zahlbruckneri** (Hasse) Wetmore, *Ann. Missouri Bot. Gard.* **57**, 205 ('1970') [1971].

Known from acid rocks in arid zones of Africa, Asia and North America, and previously from Western Australia, South Australia and the Northern Territory.

SPECIMEN EXAMINED

*Queensland*: • Idalia National Park, ridge 1 km W of Park Office, 24°53'S, 144°46'E, on rocky outcrop, *R.W. Rogers* 10499 (AQ 647651).

15. **Placidium lacinulatum** (Ach.) Breuss., *Ann. Naturhist. Mus. Wien* **98**, 39 (1996)

Cosmopolitan on arid soils, and previously known from the Northern Territory, South Australia and New South Wales.

SPECIMENS EXAMINED

*Queensland*: • Idalia National Park, c. 5 km W of the Park Office, 24°53'S, 144°4'E, on soil in mulga woodland, *R.W. Rogers* 10500, 12.ii.1996 (AQ 647652); • E of Roma 26°35'S, 149°01'E, on soil in poplar box woodland, *R.W. Rogers* 10679, 6.vii.2004 (AQ 648588, 648589); • about 5 km E of Jondaryan, 27°22'S, 151°36'E, on soil in a *Casuarina-Acacia* woodland, *R.W. Rogers* 10655, 15.iv.2004 (AQ 647001).

16. **Placynthium nigrum** (Huds.) S.F.Gray, *Nat. Arr. Brit. Pl.*, 395 (1821)

Subcosmopolitan, previously known in Australia from South Australia, New South Wales, the Australian Capital Territory and Tasmania.

SPECIMENS EXAMINED

*Queensland*: • near Nathan Gorge, 25°27'S, 150°08'E, soil surface in low eucalypt woodland, *R.W. Rogers* 8074, 31.viii.1985 (AQ 692799); • Eight Mile Paddock, Thylungra Station, 100 km NW of Quilpie, study site 3, 2.04 km from McGrath's Bore, 25°55'S, 143°19'E, *M.E. Tozer* 1197 & *M.G. Tozer*, 18.x.1995 (AQ 691824).

17. **Pseudocyphellaria jamesii** D.J.Galloway, *Bull. Brit. Mus. (Nat. Hist.), Bot.* **17**, 174 (1988)

Previously known from New Zealand and New South Wales.

SPECIMEN EXAMINED

*Queensland*: • Lamington National Park, near Toolana Lookout, Main Border Track in rainforest, 28°17'S, 153°09'E, windfall from canopy, *D. Halford* Q3830, vii.1999 (AQ 490923).

18. **Pseudocyphellaria nermula** D.J.Galloway, *Bull. Brit. Mus. (Nat. Hist.), Bot.* **17**, 218 (1988)

Previously known from New Zealand and New South Wales.

## SPECIMEN EXAMINED

Queensland: • Sylvester Lookout, Goomburra State Forest, 50 km NE Warwick, 27°58'S, 152°23'E, tree trunk in rainforest, *R.W. Rogers 8762*, 28.ix.1987 (AQ 693131).

19. *Punctelia borreii* (Sm.) Krog, *Nordic J. Bot.* **2**, 291 (1982)

Occurring on all continents, and previously known in Australia from New South Wales, the Australian Capital Territory, Victoria and Tasmania.

## SELECTED SPECIMENS EXAMINED

Queensland: • about 2 km NW of Yarraman, beside the d'Aguilar Highway, 26°49'27"S, 151°57'58"E, 650 m alt., *R.W. Rogers 11781*, 08.vi.2008 (AQ 754887); • Mt Glorious Rd, about 2 km past Enoggera Reservoir, 27°25'S, 152°58'E, on ironbark trunk, *R.W. Rogers 3345 & C. Beasley*, 8.v.1975, (AQ 684319); • Entrance to Slaughter Falls, Mt Coot-tha, 27°28'S, 152°58'E, bark of *Buckinghamia*, *R.W. Rogers 11173*, 5.ii.2007 (AQ 753155); • Moggill Forest, near Ugly Gully, 27°34'S, 152°52'E, on *Araucaria cunninghamii*, *R.W. Rogers & C. Beasley s.n.* (AQ 684333).

20. *Sticta caperata* (Nyl.) Nyl., *Acta Soc. Sci. Fenn.* **7**, 437 (1863)

Known from islands in the Indian and Pacific Oceans, and in Australia from northern New South Wales.

## SPECIMENS EXAMINED

Queensland: • Mt Hypipamee National Park, on road from Atherton to Kennedy Hwy W of Malanda, 17°25'33"S, 145°29'12"E, simple notophyll vine forest, on bark, *K. Takahashi 0681810*, 18.viii.2006 (AQ 797205); • Robert's Plateau, 28°1'S, 153°0'E, without collector or date (AQ 804223); • Lamington National Park, Picnic Rock, Sunshine Falls, near O'Reilly's Guest House 28°15'S, 153°09'E, c. 1000 m alt., *P. Merrotsy 201*, 12.v.1985 (AQ 8042224); • Lamington Plateaux, 2 km south of Binna Burra on the Tullawallal track, c. 300 m from the turnoff on the Border Track, on bark in rainforest, *E.M. Ross s.n.*, 27.viii.1987 (AQ 716607).

21. *Xanthoparmelia cheelii* (Gyeln.) Hale, *Phytologia* **28**, 486 (1974)

Known from rocks in Australia and New Zealand, with previous records from Western Australia, South Australia, New South Wales, the Australian Capital Territory, Victoria and Tasmania.

## SPECIMENS EXAMINED

Queensland: • Stanthorpe-Texas road at Spring Creek, 13 km from Stanthorpe, 28°40'S, 151°49'E, on granite, *M.E. Ballingall 799*, 14.xi.1982 (AQ 694413); • Numinbah Valley, Nerang Creek, 28°00'S, 153°01'E, *Rodd s.n.*, 9.vi.1986 (AQ 734111); • Beside Rosewood-Laidley road, c. 3.5 km E of Laidley, 27°39'38"S, 152°25'17"E, c. 300 m alt., on rock outcrop in eucalypt woodland, *R.W. Rogers s.n.*, 22.ii.2011 (AQ 832377).

22. *Xanthoparmelia prodromosii* Hale, Elix & J. Johnst., in Elix & Johnston, *Mycotaxon* **31**, 506 (1988)

Known from arid-zone rocks in Australia and South Africa, with previous Australian records from New South Wales and the Northern Territory.

## SPECIMEN EXAMINED

Queensland: • 20 km W of Vergemont H.S., 23°30'S, 142°48'E, *V.J. Neldner & T.D. Stanley s.n.*, iv.1986 (AQ 642749).

23. *Xanthoparmelia subcrustacea* (Gyeln.) Hale, *Mycotaxon* **20**, 79 (1984)

Endemic to southern and central Australia, previously reported from rocks in arid to sub-arid regions in Western Australia, South Australia, the Northern Territory, New South Wales, the Australian Capital Territory and Victoria.

## SPECIMEN EXAMINED

Queensland: • 5 km north of Chinchilla on road to Barakula, 26°31'S, 150°37'E, *T.D. Stanley s.n.*, 19.vii.1988 (AQ 642750).

24. *Xanthoparmelia subloxodella* (Elix & Kantvilas) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch, *Taxon* **53**, 971 (2004)

Endemic to southern Australia, previously reported from Western Australia, South Australia, New South Wales and Tasmania.

## SPECIMEN EXAMINED

Queensland: • Glenlyon Rd near Glenlyon Dam, 27.492°S, 152.925°E, rock on eroded soil, *R.W. Rogers 11897*, 21.i.2008 (AQ 755705).

25. *Xanthoparmelia succedans* Elix & J. Johnst., in Elix et al., *Bull. Brit. Mus. (Nat. Hist.), Bot.* **15**, 333 (1986)

Known from Australia and South America, with previous Australian records from arid rocks in Western Australia and New South Wales.

## SPECIMEN EXAMINED

Queensland: • Thomby Range, 27°30'S, 149°15'E, on rock, *T.D. Stanley & P.R. Robins*, 23.v.1989 (AQ 642751).

26. *Xanthoparmelia sulcifera* (Kurok.) Hale, *Mycotaxon* **20**, 79 (1984)

An Australian endemic growing on dry soil; previously reported from New South Wales.

## SPECIMEN EXAMINED

Queensland: • creek bank, c. 40 km E of Goondiwindi, 28.414°S, 151.084°E, eroded soil in *Callitris-Eucalyptus* woodland, *R.W. Rogers 11445*, 08.i.2008 (AQ 755706).

27. *Xanthoparmelia terrestris* (Kurok. & Filson) Elix & J. Johnst., in Elix et al., *Bull. Brit. Mus. (Nat. Hist.), Bot.* **15**, 341 (1986)

Australian endemic, on dry soil, and previously reported from Western Australia, South Australia, New South Wales and Victoria.

## SPECIMEN EXAMINED

Queensland: • Tara-Chinchilla road, near shire boundary, 27°02'S, 153°31'E, *M.E. Ballingall 812 & G.R. Scott*, 21.xi.1982 (AQ 694420).

28. *Xanthoparmelia verrucella* (Essl.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch, *Taxon* **53**, 972 (2004)

On rock or soil in Africa, Australia and New Zealand. Previously known from Western Australia, South Australia, the Northern Territory, New South Wales, the Australian Capital Territory, Victoria and Tasmania.

## SPECIMENS EXAMINED

Queensland: • Lonesome National Park, picnic area on cliffs overlooking Arcadia Valley, 25°30'S, 148°49'E, *E.M. Ross s.n.*, 9.vi.1986 (AQ 688729); • road to Mt Mee Forest Station, near the forest boundary, 27°07'S, 152°46'E, *R.W. Rogers 2350*, 9.x.1981 (AQ 688729).

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## Four Tasmanian lichens new to New Zealand

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### Abstract

Four crustose lichen species are reported for New Zealand for the first time: *Jarmania tristis* Kantvilas, *Mycoblastus kalioruber* Kantvilas, *Pertusaria flavoexpansa* Kantvilas & Elix and *Pseudoramonia richiae* Kantvilas & Vězda. All four species were previously considered Tasmanian endemics. The *Jarmania tristis* and *Pseudoramonia richiae* specimens are the first representatives of their genera in New Zealand.

### Introduction

Endemism can be difficult to measure when dealing with poorly known groups of organisms and where the regional biota has been explored to varying degrees. Lichens provide an excellent example of that, and apparent “hotspots” of endemism might simply be a function of local activity (Kantvilas 2008). For example, when the first edition of the *New Zealand Lichen Flora* was published (Galloway 1985), about 40% of the species were cited as endemic only because they had not been recorded from anywhere else. The interest in lichens inspired (or supported) by that *Flora* soon led to the discovery of many putative New Zealand endemics in other regions, in particular Tasmania (e.g. Kantvilas *et al.* 1985; Kantvilas & James 1987, 1991). More recently, as a result of the intensive lichenological exploration of Tasmania (chiefly by the second author but also others), the number of Tasmanian endemics increased from 10.5% of the total in 2005 to 11.2% in 2015 (see Kantvilas 2012). The challenge has thus gone out to workers everywhere to find in their territories species thought to be endemic elsewhere. This paper reports four such discoveries for New Zealand.

### Material and methods

All material was collected by the first author from New Zealand’s South Island or Stewart Island. Identification (or confirmation of identification) was undertaken on duplicate specimens sent to the second author. Voucher specimens were deposited in OTA, CHR and HO.

Photographic documentation of the New Zealand specimens was carried out by the first author using a dissecting microscope with integrated digital camera (Leica EZ4D). All images may be freely reproduced for educational and non-commercial purposes, provided this paper is cited in full as the source.

### NEW RECORDS FOR NEW ZEALAND

#### 1. *Jarmania tristis* Kantvilas, *Lichenologist* 28, 230 (1996)

*Jarmania tristis* is characterized by its yellowish, byssoid thallus that contains grayanic and usnic acids, immarginate, yellowish grey to blackish apothecia, *Bacidia*-type asci and indistinctly multiseptate, filiform ascospores (see Kantvilas 1996 for a complete description). It is locally abundant in cool temperate rainforest in Tasmania where it is most frequently seen on the undersides of inclined small trunks and limbs in the shaded understorey. Recently it has also been found in Victoria (Elix *et al.* 2009). It is here recorded from one New Zealand locality, the Garden Mount Track on Stewart Island, where it grows on an old kamahi tree directly along the track. It occurs on the sparsely vegetated overhanging side of the trunk, where the bright sulphur-yellow colour of the thalli (Figs 1–4) stands out from metres away. The precise location has not been recorded (by GPS), but it is within 500 m of the coordinates given below. The

specimen was collected during a field trip of the 27th John Child Bryophyte and Lichen Workshop held in Oban in November 2012.

#### SPECIMEN EXAMINED

New Zealand: *Stewart Island*: • Garden Mount Track, 46°52’S 168°07’E, 50–150 m, under overhang on bark of old kamahi tree, *Lars Ludwig s.n.*, 24.xi.2012 (CHR, HO, OTA 064267).

#### 2. *Mycoblastus kalioruber* Kantvilas, *Lichenologist* 41, 170 (2009)

*Mycoblastus kalioruber* is a corticolous, wet forest and heathland species, currently known from Tasmania and Victoria. In common with some other superficially similar species, *viz.* *M. coniophorus* (Elix & A.W.Archer) Kantvilas & Elix and *M. dissimulans* (Nyl.) Zahlbr., it contains perlatolic acid, but is easily distinguished by the distinctive K<sup>+</sup> blood-red reaction of the hypothecium in 10% KOH (Kantvilas 2009). Development of that reaction in a hand-cut section of an apothecium is illustrated in Fig. 5. Image **a** was taken before application, image **b** immediately afterward, and images **c** and **d** in c. 20-second intervals thereafter. The reaction itself is instantaneous, but a coverslip slows down the diffusion of the KOH towards the centre of the section.

The single known New Zealand locality, the Denniston Plateau near Westport, is in dense, low manuka scrub. The site is heavily threatened by the open-cast coal mining proposed by Bathhurst NZ Ltd, and is likely to be destroyed in the near future.

#### SPECIMEN EXAMINED

New Zealand: *West Coast*: • Denniston Plateau near Westport, 41°46’18.5’’S, 171°47’08.5’’E, 700 m alt., on manuka scrub c. 1.2 m tall, *Lars Ludwig s.n.*, 10.x.2013 (HO, OTA 064251).

#### 3. *Pertusaria flavoexpansa* Kantvilas & Elix, *Sauteria* 15, 253 (2008)

*Pertusaria flavoexpansa* is characterized by a pale yellow, crustose thallus that overgrows soil, pebbles, rocks, low shrubs and dead plant matter in mountainous environments. Its apothecia are immersed in gall-like verrucae, and the asci contain a single, thick-walled (5–10 µm), very large spore, (106–)130–168(–220) × (40–)84(–112) µm. The main secondary metabolites are usnic acid and 5-O-methylhiassic acid; see Kantvilas & Elix (2008) or Archer (2012) for a full description.

The species is widespread and common in the Tasmanian highlands. The first New Zealand collections were made during the Denniston Plateau BioBlitz in March 2012, which was an attempt to persuade the government not to grant resource content to Bathhurst NZ Ltd’s proposal for an open-cast coal mine in the area, by providing evidence of the unique and high biodiversity of the plateau. The species is very abundant on the plateau, and gives a creamy-yellow tinge to areas up to several square metres in extent, where it encrusts dead grass and rotting wood in fully exposed sites. The black surface of the apothecia is often strongly eroded, so that the paler spores and asci are fully exposed, which gives them the appearance of a clutch of insect eggs (Fig. 7). Occasionally the exposed spores are even transversally abraded, providing views inside the spore and showing the extremely thick spore walls (Fig. 8). Another noteworthy observation is that the lignicolous Denniston specimens are covered with dense black aggregations of pycnidia (Fig. 6), but often lack mature apothecia. A further collection from central Stewart Island suggests that the species might be more widespread in New Zealand.

#### SPECIMENS EXAMINED

New Zealand: *West Coast*: • Whareatea Mine area, Denniston Plateau near Westport, c. 41°46’S 171°47’E, c. 650 m alt., on dead grass litter, apothecia strongly eroded, spores exposed, *Lars Ludwig s.n.*, 03.iii.2012 (CHR, OTA 064276); • *loc. id.*, 41°46’27’’S, 171°47’31’’E, 640 m alt., semi-exposed on rotting wood just South of “Lake Brazil”, *Lars Ludwig s.n.*, 03.iii.2012 (CHR, OTA 064277); • *loc. id.*, 41°46’S, 171°47’E, c. 650 m alt., on rotting wood, fertile and with numerous pycnidia, *Lars Ludwig s.n.*, 03.iii.2012

(OTA 064281); • Webb stream headwaters, Denniston Plateau near Westport, c. 41°42'50"S, 171°51'45"E, 770 m alt., encrusting grass litter, *Lars Ludwig s.n.*, 04.iii.2012 (CHR, OTA 064279). *Stewart Island*: • Doughboy Hill, c. 47°01'S, 167°45'E, 200–420 m alt., on rotting tussock, *Lars Ludwig s.n.*, 30.iii.2013 (CHR, HO, OTA 064280).

#### 4. *Pseudoramonia richeae* Kantvilas & Vězda, *Lichenologist* 32, 344 (2000)

*Pseudoramonia richeae* is characterized by a densely isidiate, pale greyish, crustose thallus containing succinprotocetraric acid, apothecia borne on isidia-like stalks, and narrowly ellipsoid to fusiform ascospores with 7(–9) slightly thickened transverse septa. For detailed description and illustrations see Kantvilas & Vězda (2000).

In Tasmania, the species is common at alpine elevations, where it grows on the dead leaves of the dense shrub *Richea scoparia*, and less commonly on dead plant material (especially grasses) or directly on bark. In New Zealand it grows over slowly decaying plant matter and bark of shrubs in subalpine habitats in two Otago localities. It is fairly abundant in the subalpine regions of the Blue Mts, where it forms a grey crust of brittle isidia (Figs. 9 & 10) over dead tussock mounds and other plant detritus, usually in damp, boggy sites, frequently with *Icmadophila splachnirima*. It is much less common in the Silver Peaks and Swampy Summit near Dunedin, but there its isidia form compact micro-cushions (Figs. 11 & 12). No fertile material has been seen in New Zealand so far. Identification of sterile material is difficult, because several other crustose species have pale to greyish isidia. Comparison with authentic herbarium specimens or confirmation by the senior author is advisable. Its presence in New Zealand was first mentioned in Ludwig (2012), but without locality details or citation of voucher specimens; therefore, this paper should be considered its first official New Zealand record.

#### SPECIMENS EXAMINED

New Zealand: *Otago*: • Silver Peaks N of Dunedin, 45°44'23.5"S, 170°26'53.3"E, 725 m alt., S-facing peaty slope, with tiny cushion structures, *Lars Ludwig s.n.*, 20.iii.2011 (CHR, OTA 064273); • *loc. id.*, between Pulpit Rock and Devil's Staircase, 45°44'38.0"S, 170°27'05.8"E, 720 m alt., *Lars Ludwig s.n.*, 04.viii.2011 (OTA 064274); • *loc. id.*, 45°44'34.6"S, 170°27'06.5"E, 740 m alt., SW-S-facing vertical edge of track, big patch (c. 15 cm diameter) mostly on soil and detritus, *Lars Ludwig s.n.*, 04.viii.2011 (OTA 064275); • Swampy Summit North of Dunedin, 45°47'52.7"S, 170°28'56.1"E, 720 m alt., on *Pentachondra pumila* in bog by tarn on S-facing slope, *Lars Ludwig s.n.*, 05.viii.2014 (HO, OTA 064304); • Blue Mountains near Tapanui, 45°53'28.5"S, 169°23'20.6"E, 988 m alt., on peat under *Phyllocladus alpinus* shrub, hidden, exposed to South, *Lars Ludwig s.n.*, 03.ii.2011 (CHR, HO, OTA 064272); • *loc. id.*, 45°53'31.5"S, 169°23'19.2"E, 985 m alt., on dead grass (tussock base), S-exposed, *Lars Ludwig s.n.*, 03.ii.2011 (OTA 064271).

#### Acknowledgements

The first author is grateful for scholarship funding by the University of Otago, and also thanks Prof. Jack Elix for the initial chemical analysis of a *P. richeae* sample. He also thanks John B. Steel for organising the Stewart Island John Child workshop, as well as Sue Maturin and Dr David Glenny for taking him to the Denniston Plateau. The Department of Conservation is thanked for providing collecting permits.

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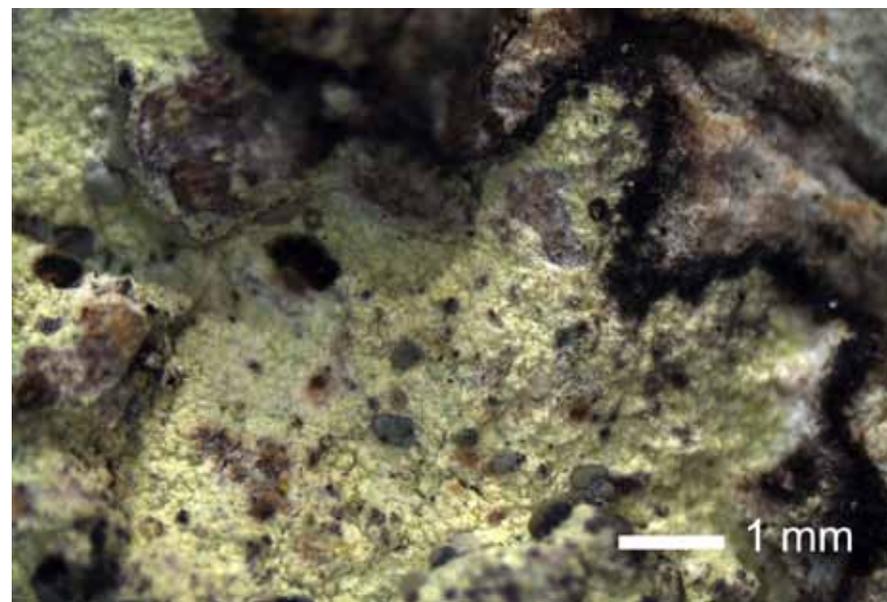


Figure 1. Habit of *Jarmania tristis* from Stewart Island, New Zealand.

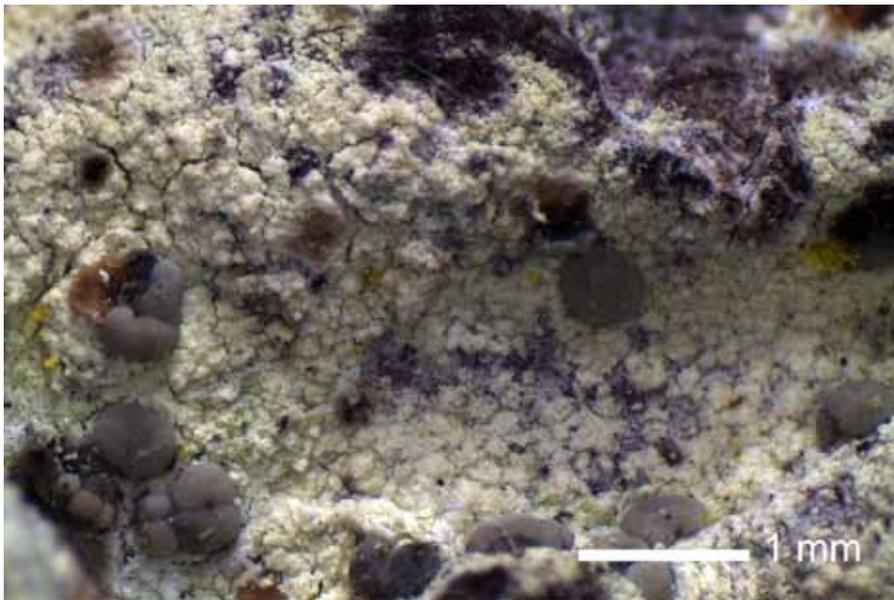


Figure 2. Grey apothecia in the thallus centre of Stewart Island *Jarmania tristis*. The brown spots are decayed, eroded apothecia where the hypothecium is exposed.



Figure 4. *Mycoblastus kalioruber*, habit in Denniston Plateau.

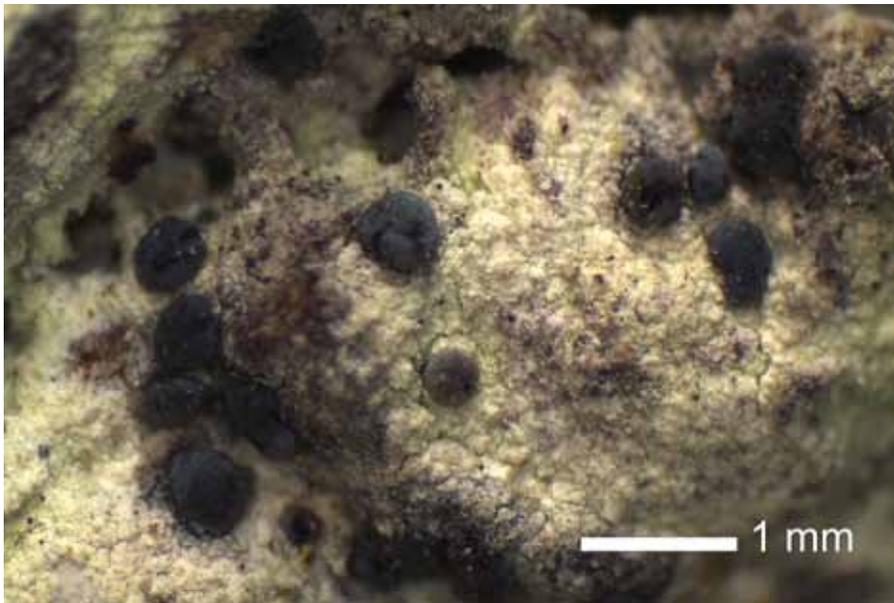


Figure 3. *Jarmania tristis* from Stewart Island. Dark epruinose apothecia.

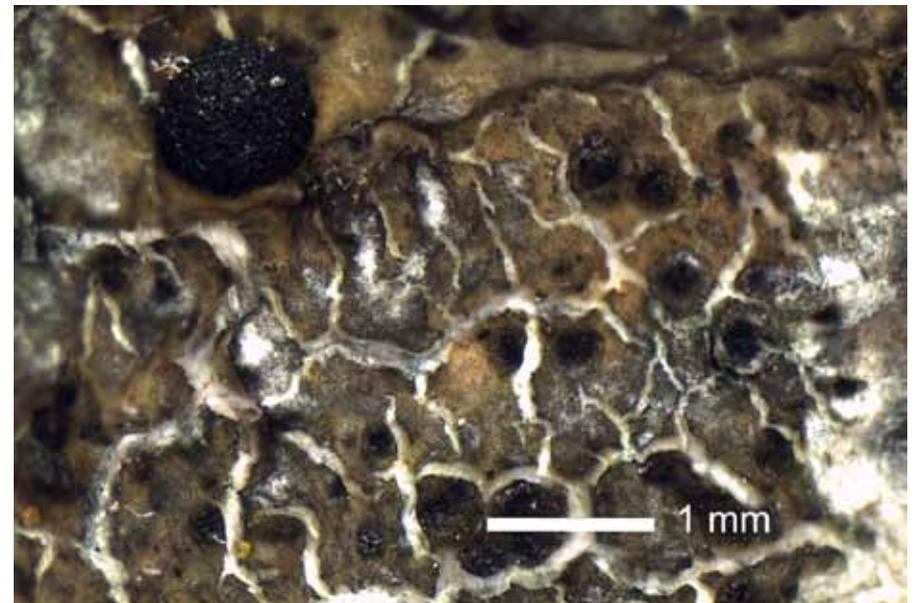


Figure 4. *Mycoblastus kalioruber*, detail of habit in Denniston Plateau.

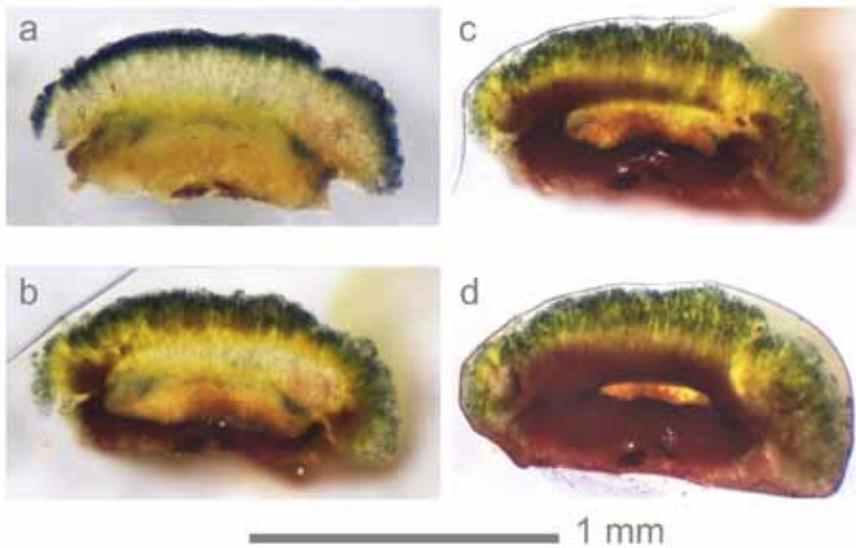


Figure 5. Hypothecium of *Mycoblastus kalioruber*. Micrograph sequence of development of the distinctive 10% K<sup>+</sup> blood-red colour reaction (see text for explanation).



Figure 6. Habit of *Pertusaria flavoexpansa* on wood from Denniston Plateau. The apothecia are the small (< 0.5 mm), blackish spots with a clear circular outline. The large (>1 mm) diffusely outlined black spots seem to be aggregations of pycnidia.



Figure 7. *Pertusaria flavoexpansa*, habit on rotting grass on Denniston Plateau. The apothecia are strongly eroded, exposing the large pale spores and asci, which resemble a clutch of insect eggs.

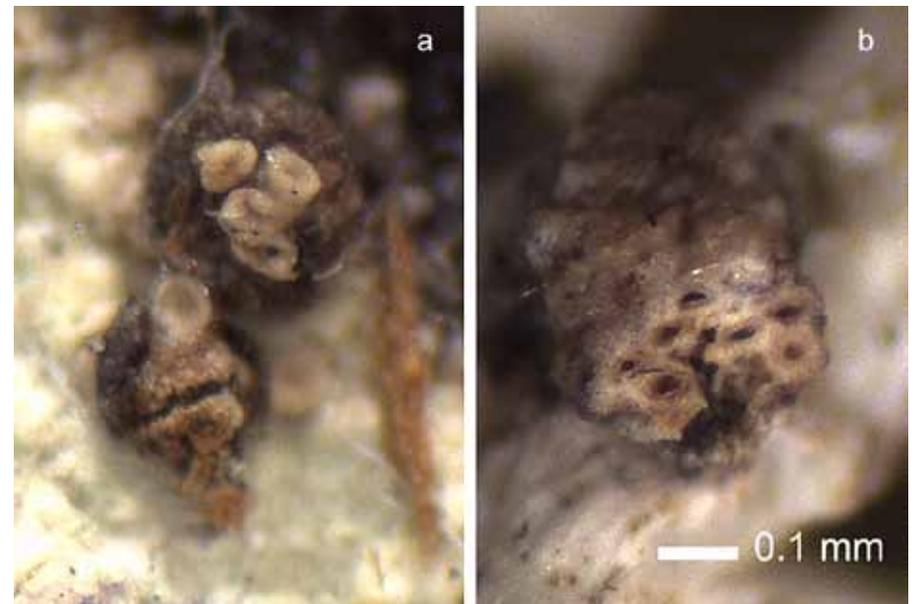


Figure 8. Close-up of eroded apothecia of *Pertusaria flavoexpansa*, showing transversally abraded spores/asci with very thick walls.

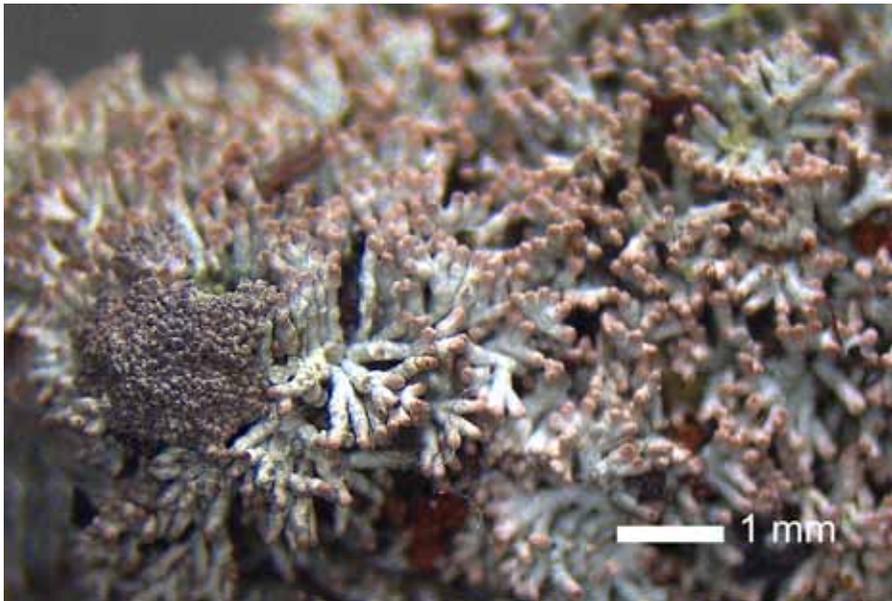


Figure 9. Habit of *Pseudoramonia richeae* from Blue Mts, New Zealand.

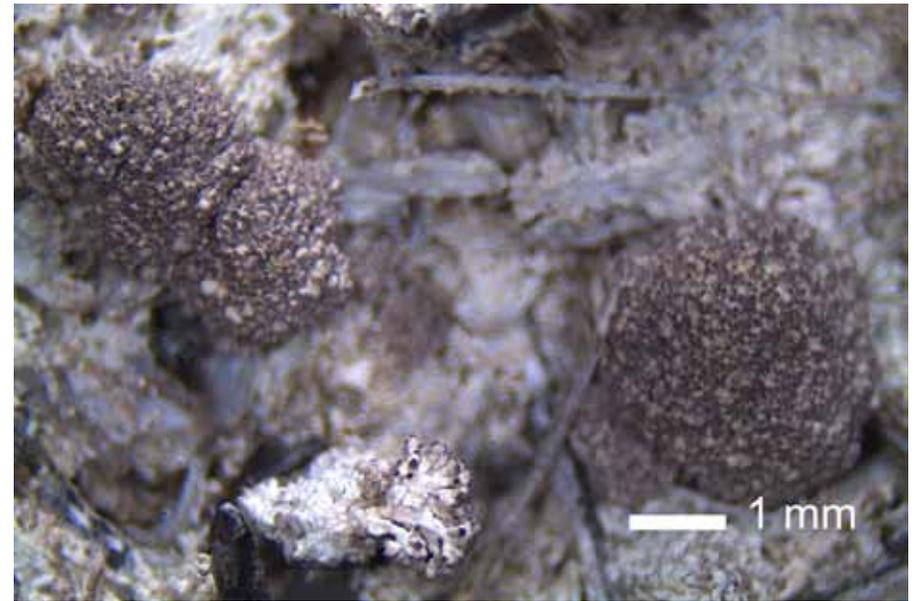


Figure 11. Habit of the compact micro-cushion growth form of *Pseudoramonia richeae*.



Figure 10. Close-up of isidia of *Pseudoramonia richeae* from Blue Mts, New Zealand.



Figure 12. Section through compact micro-cushion of *Pseudoramonia richeae*, showing densely aggregated isidia.

## Additional lichen records from New Zealand 49.

*Pertusaria puffina* A.W. Archer & Elix

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### Abstract

*Pertusaria puffina* A.W. Archer & Elix is reported for the first time from New Zealand.

### Introduction

*Pertusaria puffina* A.W. Archer & Elix was first described from material collected on Lord Howe Island (Archer & Elix 1994). Since then the species has been reported from mainland Australia (Archer 2004), Papua New Guinea (Elix *et al.* 1997), Thailand (Mongkolsuk *et al.* 2011) and India (Rai *et al.* 2014), but not New Zealand (Galloway 1985, 2007 and de Lange *et al.* 2012). A search of mangroves in northern New Zealand discovered three populations in the Kaipara Harbour (Fig. 1), and a search through the unidentified *Pertusariae* in AK found a collection from the inner Hauraki Gulf (Fig. 1).

### Materials and methods

Specimens were examined with standard microscopic techniques. Chemical constituents were identified with thin-layer chromatography (Culberson 1972, White & James 1985).

*Pertusaria puffina* A.W. Archer & Elix, *Teloepa* 6, 22 (1994)

(Adapted from Archer & Elix 1994) *Thallus* dull yellow, thin, cracked, smooth and glossy. *Isidia* absent. *Soralia* numerous, scattered, white to greenish white, disciform, 0.4–1.0 mm diam. *Apothecia* not seen.

*Chemistry*: Thallus K+ pale yellow, KC–, C–, Pd–; containing 2,4-dichlorolichexanthone (major), 2,5-dichlorolichexanthone (major), 2,4,5-trichlorolichexanthone (major), stictic acid (major), 2-chlorolichexanthone (minor) and constictic acid (minor).

### Remarks

The species is characterized by a dull yellow, cracked thallus, numerous green-white discoid soralia (Fig. 2) and distinctive chemistry, including orange fluorescence under UV. Few other *Pertusaria* species can be mistaken for *P. puffina*, although the isidiate species *P. subisidiosa* A.W. Archer has a similar chemistry.

To date, *Pertusaria puffina* has been collected at only three locations in the Kaipara Harbour and one in the inner Hauraki Gulf (Fig. 1), with one or a few populations at each site. The species is corticolous on mainly mangroves (*Avicennia marina* subsp. *australasica* (Walp.) J. Everett, (Fig. 3) or less commonly on pohutukawa (*Metrosideros excelsa* Sol. ex Gaertn.) and other tree species occurring close to the mangroves, among them kanuka (*Kunzea robusta* de Lange & Toelken) and puriri (*Vitex lucens* Kirk). A survey of eight other Kaipara Harbour sites, 18 mangrove sites elsewhere in the upper North Island, and coastal pohutukawa trees across the Auckland Region failed to find the species. It appears to prefer high light environments, usually occurring on sheltered sides of the trunks and some branches of mature mangroves up to 2 metres above the ground. Lichens commonly associated with the species include *Crocodia aurata* (Ach.) Link, *Heterodermia japonica* (M. Satô) Swinscow & Krog, *Leptogium aucklandicum* Zahlbr., *Pannaria araneosa* (C. Bab.) Hue, *P. elixii* P.M. Jørg. & D.J. Galloway, *Parmotrema perlatum* (Huds.) M. Choisy, *P. reticulatum* (Taylor) M. Choisy, *P. subtinctorium* (Zahlbr.) Hale, *Pertusaria melaleucoides* Müll. Arg., *P. psoromica* A.W. Archer & Elix, *P. sorodes* Stirt., *Physcia tribacoides* Nyl., *Pyrenula sexlocularis* (Nyl.) Müll. Arg., *Sticta squamata* D.J. Galloway and *Usnea rubicunda* Stirt.

*Pertusaria puffina* is corticolous in Thailand (Mongkolsuk *et al.* 2011) and New Zealand, saxicolous in Lord Howe Island (Archer & Elix 1994), corticolous and saxicolous in eastern Australia (Archer 2012), and terricolous in Papua New Guinea (Elix *et al.* 1997) and India (Rai *et al.* 2014).

### Conservation Status

The species appears to be very uncommon in New Zealand, having been collected at only three sites in the Kaipara Harbour and another in the inner Hauraki Gulf. In the Kaipara Harbour, it is perhaps in decline as a result of habitat disturbance and mangrove clearance. We estimate that the four populations total 250–1000 thalli in an area of less than 10 ha. Assuming that the populations are stable or declining only slowly, and considering that they are few, small, and geographically near to each other, we submit that the most appropriate threat status is “Nationally Endangered”, with the qualifier “Data Poor” (Townsend *et al.* 2008).

### SPECIMENS EXAMINED

*North Island*: • Mataia Bay, Kaipara Harbour, 36°29'25"S, 174°25'54"E, 2 m alt., growing on *Avicennia marina* subsp. *australasica*, O. Er & C. Reynolds, 16.vii.2013 (UNITEC); • *loc. id.*, 2 m alt., growing on *Metrosideros excelsa*, O. Er & C. Reynolds, 28.viii.2014 (UNITEC); • *loc. id.*, 2 m alt., growing on *Vitex lucens*, O. Er & C. Reynolds, 28.viii.2014 (UNITEC); • Mataia Bluff, Kaipara Harbour, 36°29'38"S, 174°25'27"E, 1 m alt., growing on *Metrosideros excelsa*, D.J. Blanchon, 2.x.2014 (UNITEC); • Umupuia Reserve, Hunua Ecological District, 36°54'S, 175°05'E, 45 m alt., growing on *Beilschmiedia tawa*, D.B. Rogan, 21.ix.1996 (AK); • Umupuia Beach, Hunua Ecological District, 36°54'12"S, 175°04'52"E, 2 m alt., growing on *Metrosideros excelsa*, C. Reynolds, 14.ii.2015 (UNITEC).

### Acknowledgements

We thank Gill and Kevin Adshead for site access and support, Dr Alan Archer and Professor Jack Elix for confirming the chemistry and identity of our initial specimen, Dr Peter de Lange for comments on the manuscript, and the Herbarium of the Auckland Institute and Museum (AK) for access to specimens.

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Figure 1. Sites where *Pertusaria puffina* has been collected in New Zealand (triangles).



Figure 2. Soralia of *Pertusaria puffina*, Mataia Bay, Kaipara Harbour. Bar = 2 mm.



Figure 3. Habitat of *Pertusaria puffina*, Mataia Bay, Kaipara Harbour.

## Two new species of *Rinodina* (Physciaceae, Ascomycota) from Fiji and Australia

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### Abstract

*Rinodina fijiensis* Elix & Giralt from Fiji and *R. oxydatella* Elix & Giralt from Fiji and Australia are described as new to science.

### Introduction

Fiji comprises an archipelago of more than 300 islands, with a total land area of approximately 18,000 square km, located at 15°42'S–20°02'S and 176°53'E–178°12'E. The two major islands are Viti Levu and Vanua Levu, where the majority of the population lives. The islands are mountainous, with peaks up to 1324 m high, and are covered with thick tropical forests. The climate is tropical and warm all year round with variable rainfall. Annual rainfall on the main islands is between 2000 and 3000 mm on the coast, and up to 6000 mm in the mountains.

Lichens were first described from Fiji by Krempelhuber (1873), but he did not refer to *Rinodina*. Subsequent reports of Fijian lichens by Zahlbruckner (1896) and more recently by McCarthy & Elix (1998) and Lumbsch *et al.* (2011) failed to record any collections of *Rinodina* despite Fiji's reputation as a hotspot for biodiversity. In this paper, we describe two new species of *Rinodina* from Fiji, one of which also occurs in Australia.

### The new species

*Rinodina fijiensis* Elix & Giralt, sp. nov.

Fig. 1

MB 812399

Similar to *Rinodina xanthomelana* Müll. Arg., but differs in the thallus becoming areolate and subsquamulose, in having persistently plane discs, broader ascospores, a hymenium with numerous oil paraphyses and in containing arthothelin rather than thiomelin.

*Type*: Fiji, Viti Levu, Nausori Highlands, Nadi-Sigatoka Road, western scarp, 17°43'S, 177°30'E, on moist rocks in grassland, *J.A. Elix 15102*, 26.viii.1983 (holotype – CANB).

*Thallus* crustose and areolate to subsquamulose, up to 3 cm wide, areoles contiguous to dispersed, 0.3–0.8(–1) mm wide, up to 0.75 mm thick, weakly convex to bullate; upper surface yellow to yellow-green, smooth, shiny; prothallus blackish or not apparent; vegetative propagules absent; cortex 15–25 µm thick, composed of rounded cells 5–10 µm diam.; algal layer 60–100 µm thick; medulla thick, white, 1–, lacking crystals; photobiont cells 8–15 µm diam. *Apothecia* 0.1–0.6 mm wide, lecanorine or cryptolecanorine, 1–3 per areole, immersed to subimmersed, scattered or contiguous; disc dark brown to black, epruinose, persistently plane; thalline margin concolorous with thallus, entire, persistent; proper margin thin, not prominent, concolorous with disc. *Epithymenium* 8–12 µm thick, red-brown K–, N–. *Hypotheceum* 80–100 µm thick, colourless, K–. *Hymenium* 75–100 µm thick, colourless, not inspersed; paraphyses 1–2 µm wide, simple to sparsely branched, capitate, with brown apices 3–4 µm wide, with oil paraphyses scattered throughout the hymenium; asci of the *Lecanora*-type, with 8 or fewer spores. *Ascospores* 1-septate, olive-brown then brown, ellipsoid, *Pachysporaria*-

type, 15–21 × 8–12 µm, not constricted at the septum, ontogeny of type-A; torus present in only mature ascospores; outer spore wall smooth. *Pycnidia* rare, immersed; conidia bacilliform, 5–6 × 1–1.5 µm.

*Chemistry*: Thallus K+ yellow, P+ pale yellow, C+ orange, UV+ orange; containing atranorin (minor), zeorin (minor) and arthothelin (major).

*Etymology*: The species is named after the type locality.

### Remarks

In many respects this new species closely resembles *R. xanthomelana*. Both have immersed to subimmersed, lecanorine to cryptolecanorine apothecia and similar-sized *Pachysporaria*-type ascospores, and both contain zeorin and xanthonones. However, *R. xanthomelana* lacks atranorin, and contains thiomelin and satellites rather than arthothelin. Furthermore, the thallus of *R. xanthomelana* is crustose, thin, rimose or membranaceous, and very rarely becomes areolate, whereas that of *R. fijiensis* is thick, crustose and areolate to subsquamulose. In addition, *R. fijiensis* has broader spores, 8–12 µm versus 7.5–10.5 µm, and larger apothecia, 0.1–0.6 mm wide versus 0.1–0.3 mm, and has oil paraphyses scattered throughout the hymenium. Oil paraphyses are rare or absent in *Rinodina xanthomelana*. Although oil paraphyses are more common in the related *R. thiomela* (Nyl.) Müll. Arg., that species differs from *R. fijiensis* in having adnate to sessile apothecia, larger ascospores, 20–34 × 11–17 µm, and in containing thiomelin and its congeners rather than arthothelin and atranorin (Elix 2011).

At present the new species is known from only the type collection, where associated species include *Coccocarpia palmicola* (Spreng.) Arv. & D.J. Galloway, *Dirinaria applanata* (Fée) D.D. Awasthi, *Lepraria finkii* (B. de Lesd.) R.C. Harris, *Rinodina oxydatella*, *Parmotrema reticulatum* (Taylor) M. Choisy and *Xanthoparmelia scabrosa* (Taylor) Hale.

*Rinodina oxydatella* Elix & Giralt, sp. nov.

Fig. 2

MB 812400

Similar to *Rinodina oxydata* (A. Massal.) A. Massal. but lacking the aeruginose N+ red pigment in the proper exciple.

*Type*: Australia, Queensland, Mt Walker, 15 km S of Hughenden, 20°55'S, 144°14'E, 400 m alt., on shaded boulder in dense *Eucalyptus* woodland on moderate slope, *H. Streimann 37291*, 25.vi.1986 (holotype – CANB).

*Thallus* subsquamulose to areolate-crustose, up to 5 cm wide, the areoles contiguous to dispersed, 0.5–1(–1.5) mm wide, up to 0.15 mm thick, concave with raised margins or becoming sublobate with ascending margins, ±loosely attached to the substrate; upper surface pale whitish green to grey-white or grey-brown, smooth, shiny; prothallus not apparent; vegetative propagules absent; epinecral layer present, up to 5 µm thick; cortex 30–50 µm thick, composed of rounded cells 5–10 µm diam., upper part containing crystals of atranorin; algal layer 60–80 µm thick; medulla thin, white, 1–, lacking crystals; photobiont cells 8–16 µm diam. *Apothecia* 0.1–0.6 mm wide, lecanorine or at length becoming lecideine, 1(–3) per areole, immersed to subimmersed; disc brown to black, epruinose, persistently plane; thalline margin concolorous with thallus, very thin, entire, not prominent, excluded with age; proper margin thin, not prominent, concolorous with disc. *Epithymenium* 12–15 µm thick, pale brown to brown K–, N–. *Hypotheceum* 40–50 µm thick, colourless to pale yellow-brown. *Hymenium* 60–80 µm thick, colourless, not inspersed; paraphyses 1.5–1.7 µm wide, simple to sparsely branched, capitate, with brown apices 3–5 µm wide; asci of the *Lecanora*-type, with 8 or fewer spores. *Ascospores* 1-septate, olive-brown then brown, ellipsoid, juvenile spores *Pachysporaria*-type, mature spores *Mischoblastia*-type, (15–)16–21 × 8–12 µm, lumina angular to usually triangular, not becoming rounded, not constricted at the septum, ontogeny of type-A; torus present only in mature ascospores; outer spore wall smooth. *Pycnidia* rare, immersed; conidia bacilliform, 4–5.5 × 1–1.5 µm.

**Chemistry:** Thallus K+ yellow, P+ pale yellow; containing atranorin (major).

**Etymology:** The species is named for its similarity to *Rinodina oxydata*.

#### Remarks

This saxicolous taxon is characterized by the loosely attached, subsquamulose areoles with ascending, ±sublobate margins, the presence of atranorin, the immersed to subimmersed lecanorine apothecia with plane brown to black discs, a thin thalline margin that is often excluded with age, *Mischoblastia*-type ascospores with persistently angular lumina and smooth walls, and showing a well-developed torus only when mature.

The other species of *Rinodina* that contain atranorin and have *Mischoblastia*-type ascospores are included in the *Rinodina oxydata*-group (Matzer & Mayrhofer 1996). However, unlike those taxa, *R. oxydatella* lacks the typical N+ red or reddish purple, aeruginose pigment in the proper exciple (*cinereorufa*-green or *Bagliettoana*-green pigment).

The new species is presently known from several localities in north Queensland and from Fiji. Associated species in Queensland include *Australiaena streimannii* Matzer, H. Mayrhofer & Elix, *Caloplaca leptozona* (Nyl.) Zahlbr., *Dimelaena elevata* Elix, Kalb & Wipfel, *Diploschistes actinostomus* (Pers.) Zahlbr., *Lecanora austrosorediosa* Lumbsch, *Lepraria coriensis* (Hue) Sipman, *Parmotrema praesorediosum* (Nyl.) Hale and *Pertusaria remota* A.W. Archer, the last a new record for the State.

#### SPECIMENS EXAMINED

**Queensland:** • Isla Gorge, Isla Gorge Natl Park, 27 km NNE of Taroom, 25°10'S, 149°59'E, 20 m alt., on shaded boulder in dry monsoon scrub with *Brachychiton* on gently sloping terrace above stream, H. Streimann 52630B, 31.viii.1993 (CANB).

**Fiji:** • Viti Levu, Nausori Highlands, Nadi-Sigatoka road, western scarp, 17°50'S, 177°25'E, on moist rocks in grassland, J.A. Elix 15098, 26.viii.1983 (CANB).

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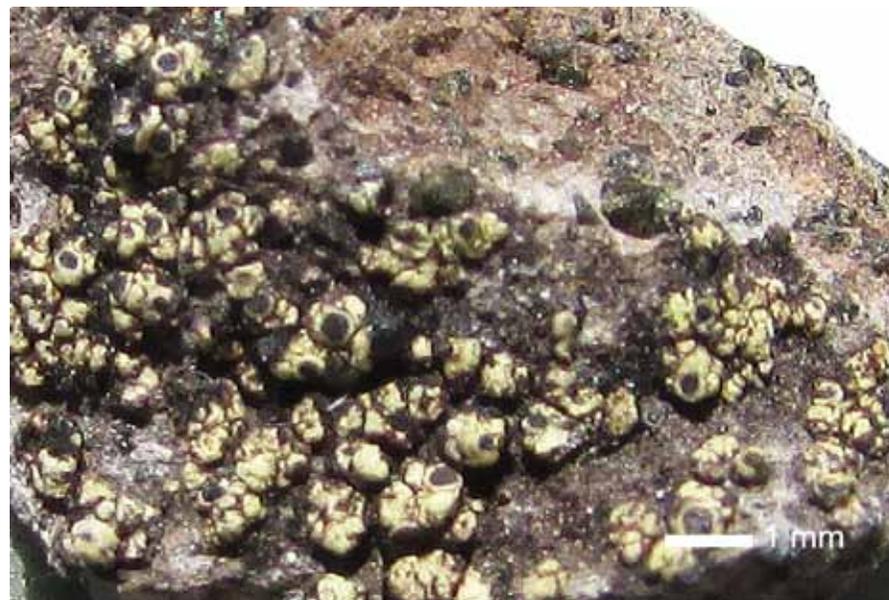


Figure 1. *Rinodina fijiensis* (holotype in CANB).



Figure 2. *Rinodina oxydatella* (holotype in CANB).

**New records and new combinations of buellioid lichens  
(Physciaceae, Ascomycota) from New Zealand**

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**Abstract**

*Amandinea coniois* (Wahlenb.) M.Choisy ex Scheid. & H.Mayrhofer, *A. isabellina* (Hue) Søchting & Øvstedal, *Baculifera entochlora* (J.Steiner) Marbach, *Buellia amandineaformis* Elix & Kantvilas, *B. austroalpina* Elix & Kantvilas, *B. homophyllia* (C.Knight) Zahlbr., *B. ocellata* (Flot.) Körb., *B. spuria* var. *amblyogona* (Müll.Arg.) Elix, *B. subcrassata* (Pusswald) Elix and *Tetramelas insignis* (Nägeli) Kalb are reported as new to New Zealand. The new combinations *Amandinea fuscoatratura* (Zahlbr.) Elix, *A. nitrophila* (Zahlbr.) Elix and *A. porulosa* (Müll.Arg.) Elix are made.

**New records for New Zealand**

**1. *Amandinea coniois*** (Wahlenb.) M.Choisy ex Scheid. & H.Mayrhofer, *Lichenologist* 25, 342 (1993)

This species was previously known from Europe, Iceland, North America (Scheidegger 2009), Antarctica and subantarctic islands (Øvstedal & Lewis Smith 2001), Tasmania (Elix & Kantvilas 2013a) and Norfolk Island (Elix 2015). It is characterized by the pale grey-brown to brown areolate to bullate or sublobate thallus, the broadly adnate to sessile apothecia up to 1 mm wide with epruinose discs, *Physconia*-then *Buellia*-type ascospores 13–18 × 7–10 µm which become constricted at the septum, filiform conidia 15–30 × 0.8–1.0 µm and by the absence of lichen substances. The species occurs on coastal rocks, and a detailed description is given in Scheidegger (2009) and Elix (2011).

**SPECIMEN EXAMINED**

*New Zealand*: • South Island, Nelson, Cable Bay, N face of Sentinel Hill, NZMS 260 O27:444054, 41°09'36"S, 173°24'36"E, 3 m alt., on rock, *W. Malcolm* 1918, 27.iv.1994 (CANB).

**2. *Amandinea isabellina*** (Hue) Søchting & Øvstedal, *Biblioth. Lichenol.* 88, 615 (2004)

This species was previously known from south-eastern Australia and Tasmania (Elix & Kantvilas 2013a; McCarthy 2015), Antarctica and South Georgia (Lamb 1968; Øvstedal & Lewis Smith 2001). It is characterized by a grey-white to pale brown or brown thallus composed of congested verruculae, the thin black to brown-black marginal prothallus, the broadly adnate to sessile apothecia up to 0.8 mm wide with epruinose discs, straight to slightly curved, ellipsoid, *Physconia*-then *Buellia*-type ascospores (12–)14–18(–20) × 7–10 µm which become constricted at the septum, filiform conidia 10–23 × 0.7–1.0 µm and by the absence of lichen substances. A detailed description is given in Lamb (1968, as *Buellia isabellina*). This species has shorter conidia than *A. coniois* and grows on exposed rocks in upland areas, typically forming small, well-separated thalli amongst other crustose lichens.

**SPECIMEN EXAMINED**

*New Zealand*: • South Island, Canterbury, Lake Ida, NZMS 262 13:392774, 43°13'12"S, 171°31'12"E, on rock, *W. Malcolm* 1925, 4.i.1994 (CANB).

**3. *Baculifera entochlora*** (J.Steiner) Marbach, *Biblioth. Lichenol.* 74, 120 (2000)

This species was known previously from Australia, East Africa, Réunion, Central and South America (Elix 2015, Marbach 2000). It is characterized by the grey to yellow-grey, smooth to weakly verruculose, crustose thallus containing norstictic and connorstictic acids (K+ red), epruinose or rarely pruinose apothecia, an olive-green to greenish black epihymenium (containing *micromera*-green pigment), a non-inspersed hymenium, *Buellia*-type ascospores, 12–18 × 6–9 µm, lacking wall-thickenings but with an ornamented outer spore wall, and bacilliform conidia 7–9 × 1–1.2 µm. A detailed description is given in Marbach (2000).

**SPECIMENS EXAMINED**

*New Zealand*: • North Island, South Auckland, Waihi-Whangamata road, on bark in gully with remnant rainforest, *J. Johnston* 2467, 2468, 20.iii.1985 (CANB); • South Island, Nelson, Hira Forest, Central Road, firebreak past Doubles Lookout, NZMS 260 O27:409920, 400 m alt., on bark, *W. Malcolm* 2090, 24.v.1994 (CANB); • South Island, Nelson, Sharland Creek, ridge above west junction of Fern Road 22, NZMS 260 O27:383955, 300 m alt., on bark, *W. Malcolm* 2130, 20.xi.1994 (CANB).

**4. *Buellia amandineaformis*** Elix & Kantvilas, *Australas. Lichenol.* 73, 24 (2013)

Previously this species was only known from Australia with collections from the Australian Capital Territory and Tasmania (Elix & Kantvilas 2013b). It is characterized by the saxicolous habit, the presence of soredia and the lack of lichen substances. The crustose, areolate, pale tan to dirty yellow-brown or olive-brown thallus can be quite variable, ranging from scabrid and sparingly sorediate along the margins of some areoles to granular and eroded with the soredia spreading over the upper surface. The lecideine, broadly adnate to sessile apothecia have black, epruinose discs and 1-septate, *Buellia*-type ascospores, 10–14 × 5–8 µm with a smooth outer spore wall and bacilliform conidia, 3–4 × 0.7–1 µm. A detailed description is given in Elix & Kantvilas (2013b).

**SPECIMENS EXAMINED**

*New Zealand*: • South Island, Nelson, Cable Bay Road, NZMS 260 O27:444045, 41°10'06"S, 173°25'E, 20 m alt., on rock, *W. Malcolm* 1937, 27.iv.1994 (CANB); • South Island, Nelson, Dun Walkway, NZMS 260 O27:352897, 220 m alt., on rock, *W. Malcolm* 2636, 24.vii.1994 (CANB).

**5. *Buellia austroalpina*** Elix & Kantvilas, *Australas. Lichenol.* 73, 25 (2013)

This species was previously known only from the type collection from Kosciuszko National Park in New South Wales, Australia (Elix & Kantvilas 2013b). It is characterized by the saxicolous habit, the smooth, crustose white thallus, immersed apothecia, the red-brown, N- epihymenium, the dark red-brown hypothecium and the presence of atranorin and norstictic acid. Although the widespread and variable species *B. aethalea* (Ach.) Th.Fr., is somewhat similar, it differs in having a conspicuous, black prothallus surrounding the thallus as well as in lacking atranorin, and in having a very pale brown to colourless hypothecium and an epihymenium containing aeruginose, N+ reddish pigments. *Buellia austroalpina* has scattered, cryptolecanorine or lecideine, persistently immersed apothecia with brown-black to black, epruinose discs and 1-septate, *Buellia*-type ascospores, 14–20 × 6–8 µm, with a finely ornamented outer spore wall and bacilliform conidia, 4.5–5.5 × 1 µm. A detailed description is given in Elix & Kantvilas (2013b).

#### SPECIMEN EXAMINED

*New Zealand*: • South Island, Nelson, Sharland Creek, Hira Forest, NZMS 260 O27:389945, 150 m alt., on rock, *W. Malcolm* 0826, 14.v.1993 (CANB).

#### 6. *Buellia homophyllia* (C.Knight) Zahlbr., *Cat. Lich. Univ.* 7, 366 (1931)

This is one of the most common saxicolous species of *Buellia* in mainland Australia and Tasmania, but is also known from Lord Howe Island and Norfolk Island (McCarthy 2015). *Buellia homophyllia* is characterized by the whitish to grey-white or grey, crustose thallus, with or without a prominent black prothallus, a non-amyloid medulla, the immersed then broadly adnate and commonly crowded, ±angular apothecia, a partly aeruginose, N+ red-violet to red-brown epihymenium, *Buellia*-type ascospores, 10–23 × 6–10 µm, which become constricted at the septum, bacilliform conidia 4–6 × 1 µm and the presence of atranorin and norstictic acid. A detailed description is given in Elix (2011).

#### SPECIMENS EXAMINED

*New Zealand*: • North Island, South Auckland, near Ohaki, Taupo-Waiotapu road, 38°19'S, 176°31'E, on rock outcrop, *J. Johnston* 2454, 20.iii.1985 (CANB); • South Island, Nelson, Wells Hill ridge, NZMS 260 O27:381949, on rock, *W. Malcolm* 0912, 14.v.1993 (CANB).

#### 7. *Buellia ocellata* (Flot.) Körb., *Syst. Lich. Germ.* 224 (1855)

This species is known from Europe, North America, Macaronesia, Asia and Africa (Coppins *et al.* 2009) and in south-eastern Australia (McCarthy 2015). It is characterized by an areolate to subsquamulose, yellowish to grey thallus where the areoles are typically aggregated into small patches 1–2 cm wide, the presence of arthothelin (C+ orange), immersed apothecia occurring singly in each areole, an aeruginose, N+ red-violet epihymenium, a greenish lower hymenium, *Buellia*-type ascospores, 12–22 × 6.5–12 µm and bacilliform conidia, 4–6 × 0.8–1 µm. It occurs on rock at high elevations. A detailed description is given in Coppins *et al.* (2009).

#### SPECIMENS EXAMINED

*New Zealand*: • South Island, Canterbury, Arthurs Pass National Park, Hawden River Picnic Area, 43°00'S, 171°45'E, on rock on alluvial river terrace, *W.H. Ewers* 5457, 7.xi.1989 (CANB); • South Island, Canterbury, Boyle River, 42°30'57"S, 172°22'57"E, 574 m alt., on stones in bank of old river terrace, *A. Knight*, 6.i.2015 (CANB, OTA); • South Island, Canterbury, Banks Peninsula, Mount Herbert track, 43°04'12"S, 172°46'18"E, on rock, *W. Malcolm* 1978, 26.xii.1993 (CANB).

#### 8. *Buellia spuria* (Schaer.) Anzi var. *amblyogona* (Müll.Arg.) Elix, *Australas. Lichenol.* 65, 16 (2009)

This taxon is very common on rocks in mainland Australia, and is also known from Lord Howe Island and Norfolk Island (Elix 2014, 2015). It is characterized by the whitish to grey-white or grey, crustose thallus, usually with a prominent black prothallus, an amyloid medulla, the immersed then broadly adnate to sessile, rounded apothecia, a partly aeruginose, N+ red-violet to red-brown epihymenium, *Buellia*-type ascospores, 9–16 × 4.5–7.5 µm, which rarely become constricted at the septum, bacilliform conidia 4–6 × 1–1.5 µm and the presence of atranorin and norstictic acid. It is distinguished from the superficially similar *B. homophyllia* by the amyloid medulla and smaller spores and from *Buellia spuria* (Schaer.) Anzi var. *spuria* by containing norstictic acid rather than stictic acid as the major secondary metabolite. A detailed description is given in Elix (2011).

#### SPECIMENS EXAMINED

*New Zealand*: • South Island, Nelson, Dun Walkway, NZMS 260 O27:352897, 220 m alt., on rock, *W. Malcolm* 2635, 24.vii.1994 (CANB); • South Island, Nelson, Maitai

River road, Branford Park, NZMS 260 O27:356928, 30 m alt., on rock, *W. Malcolm* 2786, 17.x.1993 (CANB); • South Island, Nelson, Maitai River track, NZMS 260 O27:361925, 20 m alt., on rock, *W. Malcolm* 3190, xii.2014 (CANB).

#### 9. *Buellia subcrassata* (Pusswald) Elix, *Fl. Australia* 57, 660 (2009)

Previously this species was known from Australia (Queensland, Tasmania) and Central America (Elix 2009). It is characterized by the white, grey-white, grey or pale yellow-grey thallus, usually 8-spored asci, a hymenium densely interspersed with oil droplets, moderately large ascospores, 26–32 × 9–12 µm, with weak septal and subapical wall thickenings and a moderately ornamented outer surface, by the presence of norstictic acid and bacilliform conidia, 5–7 × 1 µm. A detailed description is given in Elix (2009).

#### SPECIMEN EXAMINED

*New Zealand*: • South Island, Canterbury, Banks Peninsula, 1 km SW of Bossu Hill, 43°51'S, 172°53'E, 640 m alt., on dead wood in remnant *Podocarpus* forest, *J.A. Elix* 18987 & *J. Johnston*, 3.iii.1985 (CANB).

#### 10. *Tetramelas insignis* (Nägeli) Kalb, *Biblioth. Lichenol.* 88, 323 (2004)

This species was previously known from Europe, North America and Asia (Coppins *et al.* 2009). It is distinguished by its terricolous habit where it often grows over other lichens, decaying bryophytes and plant detritus. The New Zealand endemic *T. confusus* Nordin grows in analogous habitats, but differs in having larger, sessile apothecia (0.5–2.5 mm wide), smaller ascospores [14–21(–25) × 5–7.5 µm] and in containing atranorin. *Tetramelas insignis* is characterized by the white to creamish white or grey-white, warty-papillate thallus, the broadly adnate, lecideine apothecia, 0.1–1.5 mm wide, a proper margin which is often excluded in older, strongly convex apothecia, black, epruinose discs, the brown, 1-septate ascospores, 23–32 × 8–13 µm and the presence of 6-O-methylarthothelin. Descriptions and comparisons are given in Nordin (2004) and Coppins *et al.* (2009).

#### SPECIMEN EXAMINED

*New Zealand*: • South Island, Otago, Rock and Pillar Range, above Leaning Lodge Hut, 42°25'04"S, 170°05'08"E, 1240 m alt., on base of dead tussock at edge of snow bank, *A. Knight*, 6.xii.2014 (CANB, OTA).

#### The new combinations

##### *Amandinea fuscoatratura* (Zahlbr.) Elix comb. nov.

MB 812401

Basionym: *Buellia fuscoatratura* Zahlbr., *Denkschr. Akad. Wiss. Wien math.-naturwiss. Kl.* 104, 374 (1941)

Type: New Zealand: Otago, Goat Island near Dunedin, on coastal rocks, *J.S. Thomson* T 1044 (holotype: W; isotypes CHR!, OTA).

This species is characterized by a dark grey to olive-brown, mosaic-forming, rimose-areolate thallus delimited by a marginal, black prothallus, scattered, immersed to broadly adnate apothecia up to 0.8 mm wide, a non-interspersed hymenium, 8-spored asci, brown, 1-septate, *Buellia*-type ascospores, 11–16 × 6–8 µm, where the immature spores briefly exhibit weak medial wall thickenings and by the absence of lichen substances. The curved, filiform conidia, 18–25 × 0.8–1 µm, confirm that this species should be accommodated in *Amandinea*.

**Amandinea nitrophila** (Zahlbr.) Elix comb. nov.

MB 812402

Basionym: *Buellia nitrophila* Zahlbr., *Denkschr. Akad. Wiss. Wien math.-naturwiss. Kl.* **104**, 372 (1941)

Type: New Zealand: Otago, Black Head, Dunedin, on coastal rocks, *J.S. Thomson T394 (A84)* (holotype: W; isotype CHR!).

This species was previously placed in synonymy with *Amandinea otagensis* (Zahlbr.) Blaha & H.Mayrhofer (Blaha 2002, Galloway 2007), but should not have been. Although both species have immersed apothecia and similar, curved, filiform conidia, *A. otagensis* has *Physconia*- to *Orcularia*-type spores with strong medial wall-thickenings, whereas *A. nitrophila* has *Buellia*-type spores which exhibit only weak medial wall-thickenings briefly during early ascospore ontogeny. *Amandinea nitrophila* is characterized by a brown to grey-brown, rimose-areolate thallus that usually lacks a prothallus, scattered, immersed to broadly adnate apothecia up to 0.5 mm wide, a non-inspersed hymenium, 8-spored asci, brown, 1-septate, *Buellia*-type, ascospores, 16–16 × 6.5–9 µm, and the absence of lichen substances. The curved, filiform conidia, 20–30 × 1 µm, confirm that this species should be accommodated in *Amandinea*.

**Amandinea porulosa** (Müll.Arg.) Elix comb. nov.

MB 812403

Basionym: *Buellia porulosa* Müll.Arg., *Hedwigia* **3**, 130 (1893)

Type: New Zealand: *Sine loco*, *W. Colenso* [lectotype: G *vide* D.J. Galloway, *Flora of New Zealand Lichens*: 51 (1985), not seen].

This species is characterized by the lignicolous or more rarely corticolous habit, a whitish to pale grey thallus, no obvious prothallus, scattered, broadly adnate to sessile apothecia up to 0.3 mm wide, a non-inspersed hymenium, 8-spored asci, brown, 1-septate, *Pachysporaria*- then *Buellia*-type ascospores, 10–17 × 6–8.5 µm and by the absence of lichen substances. The rounded lumina of the immature, *Pachysporaria*-type spores exhibit no interconnecting canal. This species exhibits weakly curved, filiform conidia, 12–22 × 0.7 µm, confirming that it should be accommodated in *Amandinea*.

SPECIMENS EXAMINED

*New Zealand*: • South Island, Otago, Kew, Dunedin, 45°54'04"S, 170°28'24"E, 70 m alt., on horizontal surface of wooden rail in garden, *A. Knight*, 10.x.2014 (CANB, OTA); • South Island, Otago, Tunnel Beach, Dunedin, 45°55'09"S, 170°27'09"E, 80 m alt., on wooden railing in pasture beside track, *A. Knight*, 12.iii.2014 (CANB, OTA); • South Island, Otago, Tavora Reserve, near Goodwood, 45°31'32"S, 170°45'16"E, 3 m alt., on twigs of *Plagianthus divaricatus* at edge of salt marsh, *A. Knight*, 7.vi.2014 (CANB, OTA).

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New species of *Buellia sens. lat.* (Physciaceae, Ascomycota) from tropical Australia

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**Abstract**

*Buellia bohlensis* Elix, *B. dimbulahensis* Elix, *B. herveyensis* Elix, *B. hyporosea* Elix, *B. kaproorea* Elix and *B. rhizocarpella* Elix from tropical Australia are reported as new to science.

This paper continues investigations into *Buellia*-like lichens in Australia, following on from the first accounts of *Buellia* and related genera (Elix 2009, 2011; Elix and Kantvilas 2013b, 2014a, 2015) and revisions to *Amandinea* (Elix and Kantvilas 2013a), *Baculifera* (Elix and Kantvilas 2014b), *Cratiria* (Elix 2014), *Monerolechia* (Elix 2015) and other crustose Physciaceae (Elix and Kantvilas 2015). In this paper, I deal with six new saxicolous species of *Buellia* in the broad sense from tropical Australia.

**The new species**

**1. *Buellia bohlensis* Elix, sp. nov.**

Fig. 1

MB 812749

Similar to *Buellia dispersa* A.Massal. but differs in having a lobulate thallus, a dark olive-brown upper surface, a medulla that lacks calcium oxalate, shorter ascospores, and in containing confluent acid.

*Type:* Australia, Queensland, Kennedy North district, Mt. Bohle, 34 km SW of Charters Towers, 20°17'S, 146°01'E, 400 m alt., on sandstone rocks in *Eucalyptus-Xanthorrhoea*-dominated woodland, J.A. Elix 20634 & H. Streimann, 22.vi.1986 (holotype – CANB).

*Thallus* squamulose to lobulate, dark brown to dark olive-brown or brown-black, continuous, to 40 mm wide and up to 1 mm thick; lobules and squamules 0.1–0.4 mm wide and 0.3–0.6 mm long, rounded or becoming elongate at the margins, densely imbricate with age, esorediate; upper surface smooth to weakly verruculose, matt; prothallus not apparent; upper cortex c. 10 µm thick; medulla white, H<sub>2</sub>SO<sub>4</sub>–, I–; lower surface corticate in part; photobiont cells 8–18 µm diam. *Apothecia* 0.3–0.8 mm wide, lecideine, broadly adnate to sessile; disc black, epruinose, weakly concave then plane to eventually undulate; proper margin distinct, raised above but concolorous with the disc, persistent, in section 30–50 µm thick, outer zone brown to dark brown, not carbonized, K–, N–, inner paler brown. *Epithymenium* 10–12 µm thick, brown to olive-brown, K–, N–. *Hypotheceum* 35–50 µm thick, brown, K–, N–. *Hymenium* 50–65 µm thick, colourless, not dispersed; paraphyses 1.5–2 µm wide, simple to sparsely branched, capitate, with apices 3.5–6 µm wide and brown caps; asci of the *Bacidia*-type, 8 or fewer spores per ascus. *Ascospores* *Physconia*- then *Buellia*-type, 1-septate, brown to dark brown, ellipsoid, 10–15 × 5–8 µm, usually not constricted at the septum; outer spore wall smooth. *Pycnidia* immersed, brown, c. 0.1 mm wide; conidia bacilliform, 4–7 × 1–1.5 µm.

*Chemistry:* Thallus K–, P–, C–, UV–; containing confluent acid.

*Etymology:* The epithet is derived from the type locality.

**Remarks**

In many respects *B. bohlensis* resembles *B. dispersa* A.Massal. in that both can have areolate to squamulose thalli and similar apothecial anatomy. However, *B. dispersa* is characterized by a thick, bullate-areolate to subsquamulose or squamulose thallus with angular, concave squamules with a pruinose upper surface and an ecorticate

lower surface. The darker coloured *B. bohlensis* typically has rounded, convex lobules that become imbricate, and have an epruinose upper surface and a corticate lower surface. In addition the medulla of *B. dispersa* contains calcium oxalate, whereas that of *B. bohlensis* does not, and the two species differ chemically. *Buellia dispersa* invariably contains 2'-*O*-methylperlatolic acid and atranorin together with accessory confluent acid, whereas *B. bohlensis* contains only confluent acid. Further, the ascospores of *B. dispersa* are somewhat longer (10–19 µm).

The new species is presently known from several inland localities in north Queensland. Associated species include *Acarospora citrina* (Taylor) Zahlbr. ex Rech., *Buellia polyxanthonica* Elix var. *polyxanthonica*, *B. spuria* var. *amblyogona* (Müll.Arg.) Elix, *Caloplaca lateritia* (Taylor) Zahlbr., *Dirinaria aegialita* (Ach.) B.Moore, *D. confluens* (Fr.) D.D.Awasthi, *Lecidella buelliastrum* (Müll.Arg.) Knoph & Rambold, *Parmotrema praesorediosum* (Nyl.) Hale, *Pertusaria xanthoplaca* Müll.Arg., *Pyxine petricola* Nyl., *P. pungens* Zahlbr., *Xanthoparmelia amplexula* (Stirt.) Elix & J.Johnst., *X. ballingalliana* Elix & J.Johnst. and *X. tasmanica* (Taylor) Hale.

**SPECIMENS EXAMINED**

*Queensland:* • Type locality, on shaded sandstone in *Eucalyptus-Xanthorrhoea*-dominated woodland, H. Streimann 37255, 22.vi.1986 (CANB); • Burke district, c. 25 km E of Croydon, 18°14'S, 142°26'E, 110 m alt., on sandstone in open *Eucalyptus* woodland and grasses, H.T.Lumbsch 11120i2, 20.vii.1996 (CANB).

**2. *Buellia dimbulahensis* Elix, sp. nov.**

Fig. 2

MB 812750

Similar to *Buellia halonia* (Ach.) Tuck., but differs in having smaller ascospores, shorter conidia, and a non-aeruginose epithymenium, and in containing 4,5-dichlorolichexanthone.

*Type:* Australia, Queensland, Petford-Irvinebank road, 29 km S of Dimbulah, 17°25'S, 145°07'E, 620 m alt., on semi-shaded quartz boulder on creek bank in *Eucalyptus* woodland on creek flats, H. Streimann 46519, 14.xii.1990 (holotype – CANB; isotype – ESS).

*Thallus* crustose, rimose-cracked, ± areolate, continuous, matt, smooth, esorediate, yellow, pale yellow to whitish yellow, epruinose, up to 70 mm wide and 0.1 mm thick; individual areoles 0.1–0.4 mm wide, irregular, ± plane; prothallus not apparent; photobiont cells 8–13 µm wide; medulla white, lacking calcium oxalate (H<sub>2</sub>SO<sub>4</sub>–), I–. *Apothecia* 0.2–0.8 mm wide, scattered, lecideine, roundish, immersed at first then broadly adnate or becoming sessile; disc black, epruinose, plane but becoming convex with age; proper excipulum persistent, excluded in convex apothecia, black, in section 35–50 µm thick, with outer part dark brown to brown-black, K–, N+ orange-brown, inner part reddish brown. *Epithymenium* 8–10 µm thick, brown to dark olive-brown, N–. *Hypotheceum* 50–60 µm thick, red-brown to dark red-brown, K+ dark, chocolate brown. *Hymenium* 60–75 µm thick, colourless, not dispersed; paraphyses 1.5–2.0 µm wide, simple to moderately branched, capitate, with apices 4–5.5 µm wide and dark brown caps. *Asci* of the *Bacidia*-type, 8 or fewer spores per ascus. *Ascospores* of the *Buellia*-type, becoming centrally constricted, 1-septate, olive-grey to brown, broadly ellipsoid, 15–23 × 7–12 µm; outer spore wall strongly ornamented. *Pycnidia* immersed; conidia elongate-bacilliform, straight, 9–12.5 × 0.7–1 µm.

*Chemistry:* Medulla K–, C–, PD–, UV+ orange; containing 4,5-dichlorolichexanthone.

*Etymology:* The specific epithet is derived from the type locality.

**Remarks**

Morphologically the new species resembles *B. halonia*, in that both species have initially immersed apothecia and relatively large ascospores. However, *B. halonia* has an aeruginose pigment in the excipulum and epithymenium (reacting N+ red-violet),

a pigment absent in *B. dimbulahensis*, smaller *Physconia*- than *Buellia*-type ascospores (11–19 × 6–9 μm) with a finely ornamented outer wall, and shorter conidia (5–7 × 1–1.5 μm). The two species can also be readily distinguished chemically, because *B. halonia* contains either arthothelin or isoarthothelin as a major metabolite together with atranorin (minor).

The new saxicolous species is known from only inland areas of far-north Queensland and the Northern Territory. Associated species include *Australiaena streimannii* Matzer, H. Mayrhofer & Elix, *Caloplaca leptozona* (Nyl.) Zahlbr., *Dimelaena elevata* Elix, Kalb & Wippel, *D. tenuis* (Müll. Arg.) H. Mayrhofer & Wippel, *Diploschistes actinostomus* (Pers.) Zahlbr., *Lecanora austrosorediosa* Lumbsch, *Lepraria coriensis* (Hue) Sipman, *Parmotrema praesorediosum* (Nyl.) Hale, *Peltula euploca* (Ach.) Poelt ex Ozenda & Clauzade, *Pertusaria remota* A.W. Archer, *Physcia krogiae* Moberg and *Tephromela ara-furensis* Rambold.

#### SPECIMENS EXAMINED

*Northern Territory*: • Mt Bunday, Arnhem Highway, 93 km SE of Darwin, 12°53'S, 131°36'E, 40 m alt., on shaded and semi-exposed boulders in *Eucalyptus* woodland with *Celtis*, *Strychnos* and *Pouteria* with large granite outcrops, *H. Streimann* 48645, 22.vii.1991 (B, CANB, ESS); *H. Streimann* 48650, 22.vii.1991 (B, CANB).

*Queensland*: • Chillagoe-Dimbulah road, 14 km SE of Chillagoe, 17°16'S, 144°34'E, 460 m alt., on boulder in *Lysiphylum*, *Gyrocarpus*, *Brachychiton* and *Erythrina*-dominated limestone outcrop with easterly aspect, *H. Streimann* 46496, 13.xii.1990 (CANB, ESS).

#### 3. *Buellia herveyensis* Elix, sp. nov.

Fig. 3

MB 812751

Similar to *Buellia leptoclina* (Flot.) A. Massal., but differs in having a non-amyloid medulla, a K– excipulum, and longer ascospores and conidia.

*Type*: Australia, Queensland, Tabletop, Hervey Range, 39 km SW of Townsville, 19°22'S, 146°28'E, 350 m alt., on boulder in dry sclerophyll forest with *Pandanus* and *Lantana*, *H. Streimann* 37194, 20.vi.1986 (holotype – CANB).

*Thallus* crustose, continuous, rimose, matt, esorediate, reddish brown to dirty white, epruinose, to 60 mm wide and c. 0.5 mm thick; prothallus comprising a thin black line at the margin or not apparent; photobiont cells 8–13 μm wide; medulla white, lacking calcium oxalate (H<sub>2</sub>SO<sub>4</sub>–), I–. *Apothecia* 0.3–0.7 mm wide, lecideine, broadly adnate to sessile and constricted at base; disc brown-black to black, epruinose, weakly concave at first, then ±plane; proper excipulum thick, tumid, persistent, concolorous with disc, in section 50–65 μm thick, brown to brown-black, K–, N–, paler brown within. *Epithymenium* 12–15 μm thick, pale brown to brown, K–, N–. *Hypothecium* 50–75 μm thick, brown; subhypothecium dark brown to brown-black. *Hymenium* 80–100 μm thick, colourless, not interspersed; paraphyses 1.5–1.7 μm wide, simple to sparingly branched, capitate, with apices 3–4.5 μm wide and brown caps. Asci of the *Bacidia*-type, with 8 or fewer spores per ascus. *Ascospores* of the *Buellia*-type, 1-septate, brown, ellipsoid, 16–22 × 8–10 μm, older spores weakly constricted at the septum, spore wall of uniform thickness; outer spore wall strongly ornamented. *Pycnidia* very common, immersed to weakly emergent, ostiole brown to dark brown; conidia bacilliform, straight, 8–11 × 0.7–1 μm.

*Chemistry*: Thallus K+ yellow, KC–, P+ pale yellow, C–, UV–; containing atranorin.

*Etymology*: The epithet refers to the type locality.

#### Remarks

The new species is characterized by the crustose, rimose, chinky, reddish brown to dirty white thallus, the relatively large, *Buellia*-type ascospores with a strongly ornamented outer wall, elongate bacilliform conidia, and the presence of atranorin. *Buellia*

*leptoclina*, a widespread species in the Northern Hemisphere, also contains medullary atranorin (Coppins *et al.* 2007). However, *B. leptoclina* differs in having a thin, grey thallus, an I+ blue medulla, shorter, *Physconia*-type ascospores [12–16(–18) μm long] with a finely ornamented outer wall, and an excipulum that effuses an orange solution in K. *Buellia cinnabarina* U. Grube is also chemically identical, but has a medulla containing calcium oxalate (H<sub>2</sub>SO<sub>4</sub>+), smaller ascospores 13–19 × 6.5–8 μm, and a bright red subhypothecium that extends into the excipulum and effuses a yellow solution in K.

At present *B. herveyensis* is known from only the type collection. Associated species include *Canoparmelia herveyensis* Elix, *C. owariensis* (Asahina) Elix, *Cratiria vioaxanthina* (Elix) Kalb & Elix, *Dirinaria applanata* (Fée) D.D. Awasthi, *D. flava* (Müll. Arg.) C.W. Dodge, *Parmotrema reticulatum* (Taylor) M. Choisy, several *Pertusaria* species, *Porina chlorotricula* P.M. McCarthy, *Pyxine elixii* Kalb and *Xanthoparmelia australasica* D.J. Galloway.

#### 4. *Buellia hyporosea* Elix, sp. nov.

Fig. 4

MB 812752

Similar to *B. polyxanthonica* Elix var. *polyxanthonica*, but differs in having an excipulum, hypothecium and subhypothecium that effuse an intense red solution in K, and an N+ violet epithymenium.

*Type*: Australia, Queensland, Hugh Nelson Range, along Plath Road, 15 km S of Atherton, 17°25'S, 145°26'E, 1080 m alt., on granite rocks in *Eucalyptus grandis* woodland, *J.A. Elix* 16425 & *H. Streimann*, 25.vi.1984 (holotype – CANB; isotype – BRI).

*Thallus* crustose and areolate to subsquamulose, discontinuous, to 45 mm wide, up to 0.35 mm thick; upper surface smooth, matt, off-white to pale whitish grey or whitish yellow, individual areoles (subsquamules) rounded, 0.05–0.5 mm wide; prothallus marginal and between adjacent areoles, thick, black, prominent and persistent; cortex 10–15 μm thick; medulla white or red-brown pigmented in the lower part, lacking calcium oxalate (H<sub>2</sub>SO<sub>4</sub>–), I–; photobiont cells 8–13 μm diam. *Apothecia* 0.1–0.5 mm wide, scattered to crowded, rounded, broadly adnate but soon becoming sessile; disc black, epruinose, weakly concave then plane or eventually convex; proper excipulum thick and prominent at first, excluded in older, convex apothecia, in section 35–45 μm thick, outer part dark olive-green, K–, N+ violet, inner part dark red-brown, K+ red, N+ orange-brown. *Epithymenium* 12–20 μm thick, olive-green to olive-brown, K–, N+ violet. *Hypothecium* 40–60 μm thick, brown to red-brown, K+ red solution but not forming red crystals; subhypothecium intense red-brown to rust-red, 75–90 μm thick, K+ intense red solution. *Hymenium* 45–55 μm thick, colourless, not interspersed with oil droplets; paraphyses 1.0–2.0 μm wide, simple to branched, capitate, with apices 3–4 μm wide and olive-brown caps; asci of the *Bacidia*-type, 3–8-spored. *Ascospores* of the *Buellia*-type, 1-septate, grey-green to brown, ellipsoid, 12–17(–20) × 6–10 μm, not constricted at the septum, spore wall of uniform thickness; outer spore wall smooth to finely ornamented. *Pycnidia* not seen.

*Chemistry*: Thallus K–, P–, C+ orange, UV+ yellow or orange; containing thiophanic acid (major), ±3-O-methylthiophanic acid (major), isoarthothelin (minor).

*Etymology*: The epithet refers to the colour of the solution produced by treating the excipulum, hypothecium and subhypothecium with K.

#### Remarks

*Buellia hyporosea* is characterized by the smooth, dull, areolate to subsquamulose, off-white to pale whitish grey or whitish yellow thallus, sessile apothecia, an excipulum, hypothecium and subhypothecium that give an intense red solution on treatment with K, ellipsoid ascospores and the presence of thiophanic and ±3-O-methylthiophanic acids. The chemistry and morphology of the species closely resemble that of *B. polyxanthonica* var. *polyxanthonica*, but the latter differs in having a yellow to yellow-green upper surface and a dark brown, K– excipulum, hypothecium and subhypo-

thecium and an olive-brown N- epihymenium.

At present the new species is known from only far-north Queensland and the Northern Territory, where it occurs on siliceous rocks. Associated species include *Buellia mamillana* (Tuck.) W.A.Weber, *Parmotrema reticulatum* (Taylor) M.Choisy, *Pertusaria xanthoplaca* Müll.Arg. and *Pyxine cocoas* (Sw.) Nyl.

#### SPECIMENS EXAMINED

*Northern Territory*: • Baroalba Creek, 16 km SSE of Jabiru airfield, 12°49'S, 135°55'E, 200 m alt., on top of shaded boulder amongst shrubs, ferns and large boulders with easterly aspect, *H. Streimann* 42341 *pr.p.*, 21.iv.1989 (B, CANB).

*Queensland*: • Mt Finnigan, Mt Finnigan Range, Cedar Bay National Park, 39 km S of Cooktown, 15°49'S, 145°16'E, 1090 m alt., on exposed boulder in exposed heathy-grassy area with large rock outcrops, *H. Streimann* 57204, 20.x.1995 (B, CANB).

#### 5. *Buellia kaproorea* Elix, sp. nov.

MB 812753

Fig. 5

Distinguished by the minute, yellow to yellow-green squamules or areoles, the 3-septate ascospores, 12–18 × 5–7.5 µm, and the presence of arthothelin.

*Type*: Australia, Queensland, Razorback Range, 3 km NW of Mount Morgan, 23°28'S, 150°22'E, 310 m alt., on semi-exposed boulder in heathy, dry sclerophyll forest, *H. Streimann* 52393 *pr. p.*, 26.viii.1993 (holotype – CANB).

*Thallus* crustose to squamulose, discontinuous, to 30 mm wide, consisting of minute squamules or areoles, the areoles contiguous or separate, 0.5–1.5 mm wide, sublobate at the margins, sublobes 0.05–0.1 mm wide. Upper surface yellow to pale yellow-brown, matt, becoming markedly convex and bullate. Prothallus black, marginal and between adjacent areoles; cortex c. 10 µm thick; medulla white, lacking calcium oxalate (H<sub>2</sub>SO<sub>4</sub>-), I-; photobiont cells 8–13 µm diam. *Apothecia* 0.1–0.5 mm wide, lecideine, broadly adnate to sessile; disc black, epruinose, plane then becoming markedly convex; proper excipulum thin, excluded in older convex apothecia, in section 25–35 µm thick, outer zone dark brown to black-brown, K-, N+ orange-brown, inner zone brown. *Epihymenium* 10–12 µm thick, brown to dark olive-brown, K-, N-. *Hypothecium* 40–50 µm thick, dark brown, K+ black-brown, N-. *Hymenium* 35–40 µm thick, colourless, not interspersed; paraphyses 1.0–1.5 µm wide, simple to sparingly branched, capitate, with apices 3–4 µm wide and dark brown caps; asci of the *Bacidia*-type, 8 or rarely fewer spores per ascus, *Ascospores* mainly 3-septate, rarely 1-septate, brown to greenish grey, elongate ellipsoid, 12–18 × 5–7.5 µm; outer spore wall finely ornamented. *Pycnidia* not seen.

*Chemistry*: Thallus K-, C+ orange, P-, UV+ dull orange; containing arthothelin.

*Etymology*: The species name refers to the type locality — from the Greek *kápros* (wild boar) and *óros* (mountain range).

#### Remarks

*Buellia kaproorea* is a very distinctive species, readily recognised by the small, scattered, yellow to yellow-green squamules or areoles, the 3-septate ascospores, and the presence of arthothelin. Some morphotypes of *Buellia ocellata* (Flot.) Körb. also comprise discontinuous, minute squamules or areoles on a black hypothallus, and contain arthothelin, but the ascospores of that species are always 1-septate and are somewhat larger, 11–22 × 6.5–11.5 µm. The only other known arthothelin-containing species with multiseptate ascospores is the Antarctic *B. anisomera* Vain., but it lacks a prothallus, has larger, 1–2-septate ascospores, 20–22 × 6–7 µm and an I+ blue medulla (Nordin 2000).

At present the new species is known from only the type locality. Associated species include *Acarospora citrina* (Taylor) Zahlbr. ex Rech., *Australiaena streimannii* Matzer, H.Mayrhofer & Elix, *Caloplaca leptozona* (Nyl.) Zahlbr., *Dimelaena elevata* Elix, Kalb & Wippl, *Diploschistes actinostomus* (Pers.) Zahlbr., *Lecanora galactiniza* Nyl., *L. pseudistera* Nyl., *Paraporpidia leptocarpa* (C.Bab. & Mitt.) Rambold & Hertel, *Parmotrema praesorediosum* (Nyl.) Hale, *Peltula euploca* (Ach.) Poelt ex Ozenda & Clauzade and *Pertusaria remota* A.W.Archer.

#### 6. *Buellia rhizocarpella* Elix, sp. nov.

MB 8127544

Fig. 6

Similar to *Buellia amandineaeformis* Elix & Kantvilas, but differs in having delimited crateriform soralia with intense yellow soredia, and in containing rhizocarpic acid.

*Type*: Australia, Queensland, Great Dividing Range, Hughenden-Townsville Highway, 28 km SW of Pentland, 20°43'S, 145°14'E, 460 m alt., on sandstone rocks in *Eucalyptus*-dominated sandstone gorge, *J.A. Elix* 20751 & *H. Streimann*, 26.vi.1986 (holotype – CANB).

*Thallus* crustose, areolate, pale yellow-brown to dark yellow-green, continuous to dispersed in patches to 30 mm wide, sorediate in part; soralia crateriform, shallow, c. 0.1 mm diam., rarely coalescing and spreading over the surface, soredia intense yellow, finely granular; individual areoles coalescing or dispersed, 0.1–0.3 mm wide and to 0.15 mm thick, with smooth, ±blackened margins, appearing micro-lobate; prothallus not apparent; medulla intense yellow, I-; photobiont cells 8–15 µm diam. *Apothecia* 0.05–0.3 mm wide, scattered, lecideine, broadly adnate to sessile; disc black, epruinose, plane to weakly convex; proper excipulum distinct, persistent, in section 30–50 µm thick, outer zone dark brown, K-, inner zone yellow. *Epihymenium* 12–15 µm thick, dark brown, K-, N-. *Hypothecium* 25–30 µm thick, colourless to pale yellow-brown, K-. *Hymenium* 45–55 µm thick, colourless, not interspersed; paraphyses 1.5–1.8 µm wide, simple to sparingly branched, with apices 5–6 µm wide and dark brown caps; asci of the *Bacidia*-type, 8-spored. *Ascospores* at first of the *Physconia*-type, then of the *Buellia*-type, 1-septate, olive-green to brown, ellipsoid, 11–15 × 5–8 µm, usually not constricted at the septum; outer spore wall smooth. *Pycnidia* not seen.

*Chemistry*: Thallus K-, P-, C-, UV+ orange; containing rhizocarpic acid.

*Etymology*: The epithet refers to the chemistry of the species.

#### Remarks

*Buellia rhizocarpella* is a distinctive species, readily recognized by the presence of soredia and rhizocarpic acid. Superficially, it resembles *Buellia amandineaeformis*, another sorediate species with a yellowish brown upper surface. However, the two species differ chemically and in the development of the soredia. Whereas *B. amandineaeformis* is sparingly sorediate along the margins of some areoles, and becomes granular and eroded with the soredia spreading over the upper surface, the soralia of *B. rhizocarpella* are typically delimited and crateriform. *Buellia amandineaeformis* lacks lichen substances. At present rhizocarpic acid is known from only two other *Buellia* sens. lat. species, the corticolous *B. rhizocarpica* Etayo, Giral & Elix and the saxicolous *B. centralis* H.Magn. Neither of those species is sorediate, and both differ chemically from *B. rhizocarpella*, the former containing atranorin, gyrophoric, and alectorialic acids in addition to rhizocarpic acid, and the latter additional hypoprotocetraric and norotatic acids (Etayo *et al.* 2010; Obermayer *et al.* 2004). *Buellia rhizocarpica* also differs in having a dark, olivaceous-brown epihymenium containing *micromera*-green and smaller ascospores, while *B. centralis* differs in having a white medulla and a thallus with marginally radiating lobes.

The new species is known from siliceous rocks in central Queensland and the Northern Territory. Species associated with it include *Australiaena streimannii* Matzer,

H.Mayrhofer & Elix, *Caloplaca leptozona* (Nyl.) Zahlbr., *Dimelaena elevata* Elix, Kalb & Wippel, *D. tenuis* (Müll.Arg.) H.Mayrhofer & Wippel, *Diploschistes actinostomus* (Pers.) Zahlbr., *Lecanora austrosorediosa* Lumbsch, *Lepraria coriensis* (Hue) Sipman, *Parmotrema praesorediosum* (Nyl.) Hale, *Pertusaria remota* A.W.Archer and *Tephromela arafurensis* Rambold.

#### SPECIMEN EXAMINED

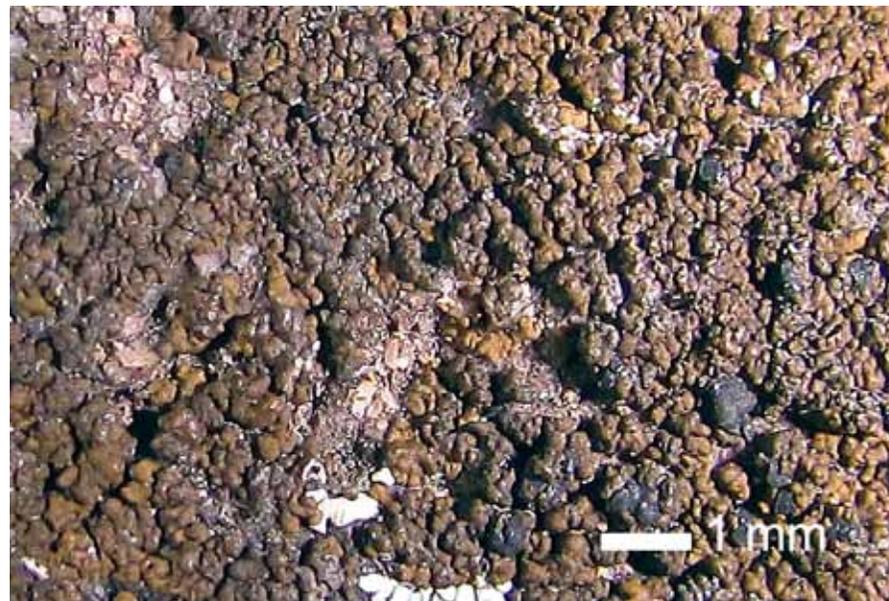
Northern Territory: • Sturt Highway, 11 km NW of Pine Creek, 13°46'S, 131°45'E, 240 m alt., on shaded rock face in *Eucalyptus*-dominated savannah below escarpment, *H. Streimann* 42108 & *J.A. Curnow*, 15.iv.1989 (CANB).

#### Acknowledgment

I would like to thank Dr Alan Archer (Sydney) for the photograph of *B. rhizocarpella*.

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1. *Buellia bohlensis* (holotype in CANB).



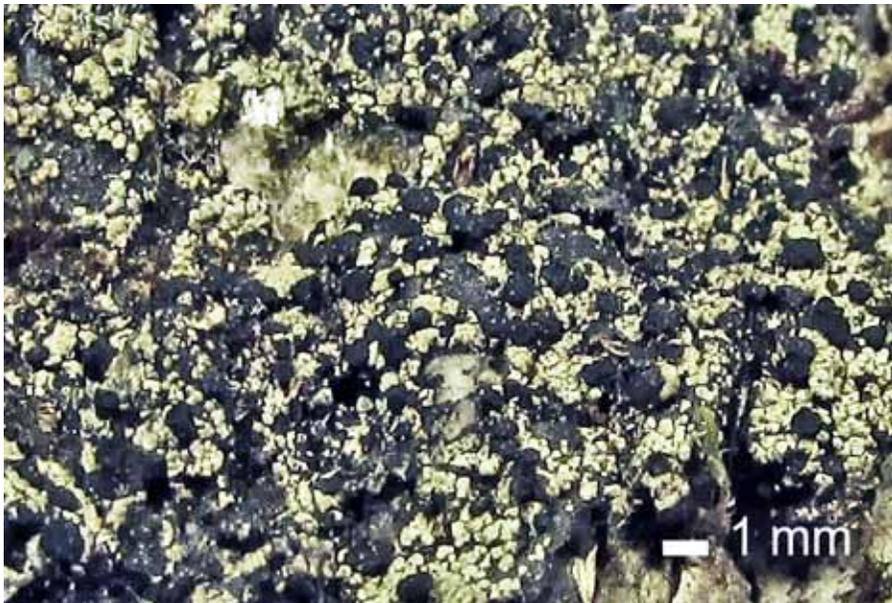
2. *Buellia dimbulahensis* (holotype in CANB).



3. *Buellia herveyensis* (holotype in CANB).



5. *Buellia kaproorea* (holotype in CANB).



4. *Buellia hyporosea* (holotype in CANB).



6. *Buellia rhizocarpella* (holotype in CANB).

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## Vale David Galloway (1942–2014)

A summary of his lichenological achievements and some personal recollections

David was born on 7 May, 1942, in Invercargill, New Zealand. His education and introduction to lichens and lichenology through his mentor Peter James have been well documented elsewhere (Galloway 2014a, b; Kärnefelt *et al.* 2015), and are not repeated here. He made enormous contributions to Southern Hemisphere lichenology – particularly in the taxonomic treatments of *Placopsis*, *Pseudocyphellaria* and *Sticta*, in his contributions to lichen biogeography, and to lichenological history. His lichen contributions and collections were centred in New Zealand, but also included mainland Australia and Tasmania, Chile and Antarctica. Some measure of his many contributions can be gleaned from Volume 95 of *Bibliotheca Lichenologica*, published on the occasion of his 65th birthday in 2007, where an impressive list of 319 publications is compiled. His publication of the *Flora of New Zealand Lichens* (1985) was the first comprehensive lichen Flora for any part of the Southern Hemisphere, and it was followed by *Tropical Lichens: their Systematics, Conservation, and Ecology* (1991, symposium volume), *New Zealand Lichens, Checklist, Key and Glossary* (1997, with W.M. Malcolm) and several *Pseudocyphellaria* monographs. His revised second edition of the *Flora of New Zealand Lichens, Lichen-forming and Lichenicolous Fungi* (2007) was and is truly monumental, comprising 2 volumes, 2261 pages treating 1707 taxa in 354 genera. David was awarded an Acharius Medal by the IAL for his many contributions to lichenology in 2009, followed by a Hutton Medal by the Royal Society of New Zealand for excellence in plant sciences in 2010. There is no doubt that as far as New Zealand lichens are concerned, his will be a hard act to follow! David was an excellent convener and organizer, as he demonstrated during his tenure as President of the IAL (International Association for Lichenology) over the period 1987–1992. Particularly memorable were the mycological meeting in Regensburg in 1989 and the London meeting on Tropical Lichens in 1990.

At the personal level I found David an enigmatic character. Although we had corresponded regularly, we first met when I spent 6 months working with him at DSIR Botany Division in Lincoln (New Zealand) in 1980. Although he was preoccupied in working on his first edition of the *Flora*, we spent several very memorable weeks in the field, in particular in the Denniston Plateau and the Nelson Lakes district of the South Island. Being exposed to so many wonderful austral lichens (with names) was a real eye-opener for me. I remember one particular incident as we ascended the steep, winding dirt road from Westport to Denniston. “Stop the car now - please” David called! I thought that he might be feeling car-sick, but no, he had spotted an interesting *Pseudocyphellaria* on the overhanging branch of a roadside tree. With his hand lens in the back seat of the car he was convinced that it was a new species – which he subsequently described as *Pseudocyphellaria margaretae* D.J.Galloway in honour of our driver and botanist colleague Margaret Bulfin. It turned out to be a good day, as we also collected *Austropeltum glareosum* Henssen, Döring & Kantvilas, *Pertusaria dennistonensis* A.W.Archer & Elix and *Pycnothelia caliginosa* D.J.Galloway & P.James for the first time. His relationship with Henry Connor, the then Director of Botany Division, was also interesting. Over time the worst of enemies became the best of friends – rather like Gough Whitlam and Malcolm Fraser for those *au fait* with Australian politics. In 1988 we were again lichenizing together – this time in the Kimberley region of Western Australia. Lichen gatherings were never dull when David was around – an extremely accomplished raconteur especially when fuelled by a wee dram of scotch and by companions like the late George Scott. He was also very adept at passing the buck to the naïve and unsuspecting – I recall having to host a BBC reporter at my elbow for an entire day after David did a runner having assured her and her accompanying photographer that “I was the man to tell the lichen story to the public”. I had exhausted my lichen stories by 11:00 a.m., and was cheesed off by lunch time, but David had disappeared into the mulga. We had a good laugh

about it that evening, but I never did see the televised documentary, damn it. On the day following a particularly hard night, we visited a location called “Silent Grove” – it seemed appropriate for such a location and sore heads to give the hammers and chisels a rest. A day later, on a very hot afternoon high in the King Leopold Range, we came across a large rock pool of crystal-clear water, well above the crocodile-infested lowland streams. David was first into the water singing excerpts from *The Marriage of Figaro*. Unfortunately, no cameras were permitted! Throughout our 35 years of collegiality, I always found David extremely generous with his praise, enthusiastic, supportive and forever encouraging me to tackle more challenging chemotaxonomic and taxonomic lichenological problems. At the social level David could be elusive, but always hospitable – like the occasion my late wife and I arrived, unannounced, at Millers Flat, central Otago, where David and Patricia were then living (January 1997). Patricia abandoned her fishing and David his Flora-writing to make us particularly welcome!

David died on 6 December, 2014, at the Otago Community Hospice, Dunedin, after a relatively short but severe illness, aged 72 years. He will be sorely missed by his family, especially his wife Patricia, and his many friends and colleagues around the world. Unfortunately, there will be no further email messages “from David in Dunedin”.

Jack Elix

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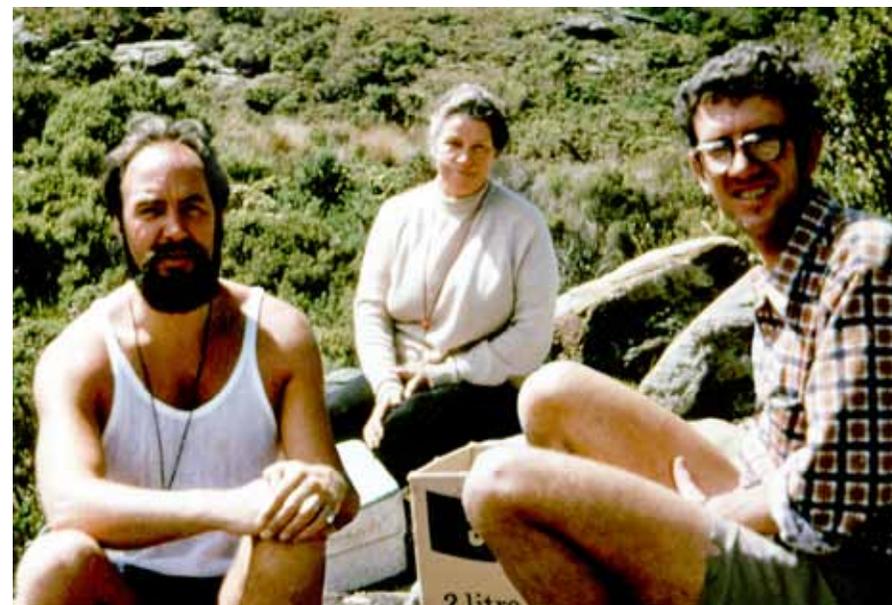
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David and Patricia at Millers Flat, 1997.



David at the British Museum, 1987.



David, Margaret Bulfin, and Jack Elix on Denniston Plateau, 1980.

# Australasian Lichenology

Number 77, July 2015 ISSN 1328-4401

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