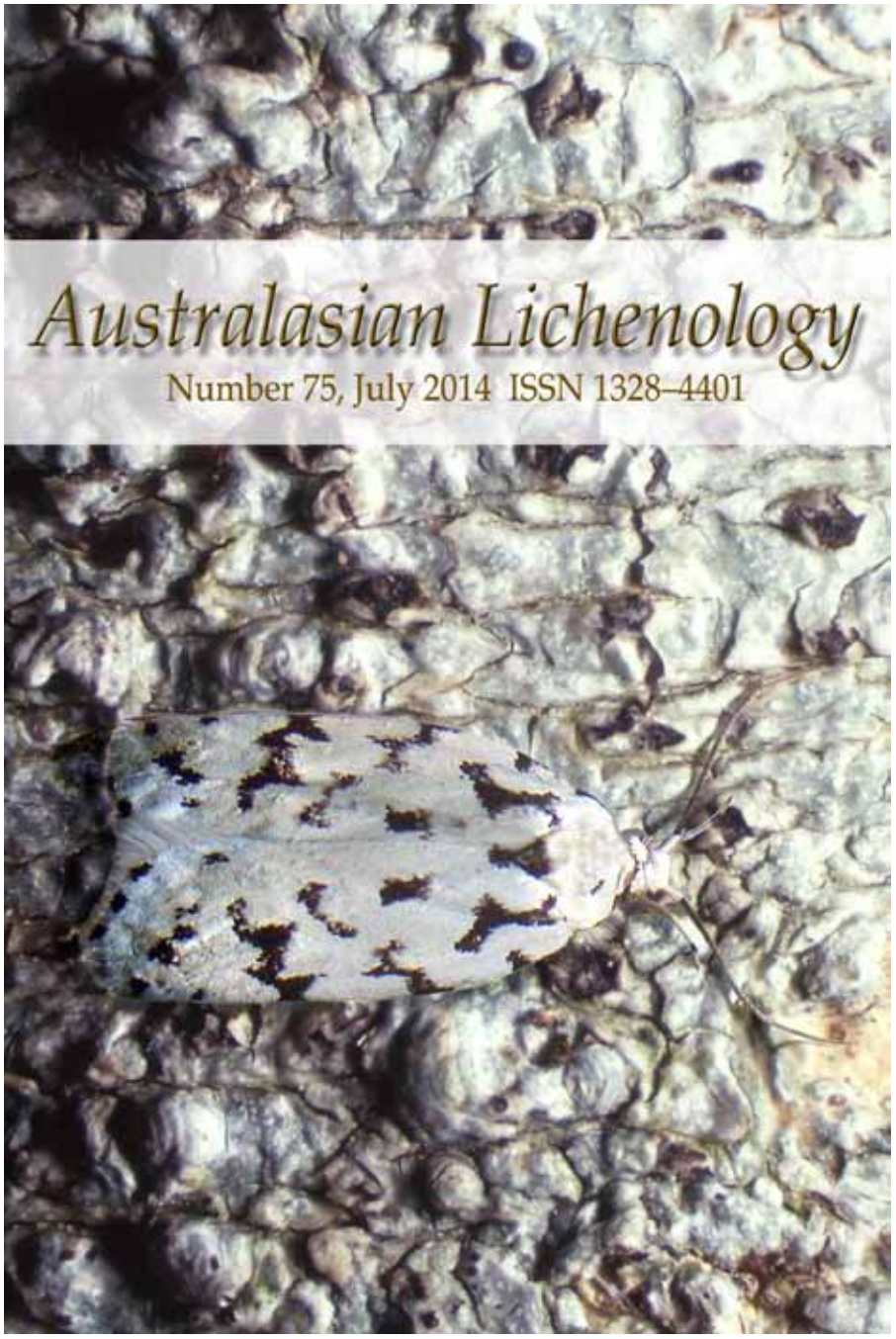

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The lichen-mimicking moth *Izatha huttonii*. On the front cover it's shown (in simulation) camouflaged against *Pertusaria celata*. *Izatha* is endemic to New Zealand. A quarter of the 40 now-accepted species mimic lichens, but only two or three actually feed on lichens as larvae, all the others feeding instead on fungi in dead wood. The camouflage of the adult moths is much enhanced by prominent tufts of scales on their forewings, legs, and head area that resemble the verrucae of *Pertusaria* species and the soredia of *Heterodermia* and parmeloid lichens.

1 mm

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Additional lichen records from Australia 77. Verrucariaceae

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Abstract: *Placopyrenium trachyticum* (Haszl.) Breuss var. *trachyticum* and *Thelidium decipiens* (Hepp) Kremp. are reported for the first time from Australia. Four other species of Verrucariaceae are newly recorded from New South Wales and South Australia.

Introduction

Field-work in temperate Australia, with special emphasis on the lichen communities of limestone, continues to expand the known diversity of Australian microlichens, among them the often inconspicuous and frequently overlooked pyrenolichen family Verrucariaceae. In this paper, *Placopyrenium trachyticum* (Haszl.) Breuss var. *trachyticum* and *Thelidium decipiens* (Hepp) Kremp. are reported for the first time from Australia; four other species are newly recorded from New South Wales and South Australia.

1. Placopyrenium trachyticum (Haszl.) Breuss var. **trachyticum**, *Studia Geobot.* **7**, Suppl. 1, 183 (1987) Fig. 1

Squamae solitary, rounded, 5–10 mm wide, medium grey or greenish grey; margins entire or the thallus with radial black-edged fissures that divide it into broad, irregular or elongate areoles and lobes. Thallus thinly corticate (cortex 10–17 μm thick), with a 60–100 μm thick algal layer subtended by a 100–300 μm thick, blackish, paraplectenchymatous medulla from which numerous short, thick, anatomically undifferentiated holdfast-like columns anchor the thallus in the clay substratum. Perithecia very numerous, immersed in the thallus, lacking an involucrellum, 0.25–0.35 mm wide; apex plane to slightly convex, dull black, 0.14–0.27 mm wide. Exciple 40–60 μm thick and brownish black at the apex, *c.* 25 μm thick and hyaline at the sides and base. Periphyses *c.* 20 × 4 μm. Asci narrowly clavate, 60–72 × 15–20 μm. Spores biseriate in the ascus, simple, ellipsoid, 14–19 × 6–9 μm.

This lichen has been confirmed from calcareous and siliceous rocks in central and southern Europe and western Russia (Breuss 2009; Krzewicka 2012). Although the Australian material occupied thallus-sized depressions in erosion channels on limestone outcrops, the actual substratum of the single thallus collected and sectioned was a 1.5 mm thick, lenticular 'cushion' of clay that had accumulated beneath it. *Placopyrenium trachyticum* var. *subtrachyticum* Breuss, known from a few widely scattered localities in Europe, is characterized by having predominantly 1-septate spores (Breuss 2009).

SPECIMEN EXAMINED

New South Wales: • Central-Western Slopes, near Canowindra-Orange road, 12 km NE of Canowindra, Grove Creek, 33°28′26″S, 148°45′22″E, alt. 400 m, highly water-eroded limestone outcrops, *P.M. McCarthy 4318*, 3.iv.2014 (CANB).

2. Polyblastia dermatodes A.Massal., *Symm. Lich. Nov.* 101 (1855)

In Australia this lichen is known from Tasmania (McCarthy 2014). It also occurs in Europe and Turkey.

SPECIMEN EXAMINED

New South Wales: • Mount Kosciuszko Natl Park, Cooleman Plain, Blue Waterholes, Caves Track, 35°37′35″S, 148°41′00″E, alt. 1186 m, sheltered limestone cliff overlooking narrow valley, *P.M. McCarthy 4234*, 11.xii.2013 (CANB).

3. Thelidium decipiens (Hepp) Kremp., *Denkschr. Bayer. Bot. Gesell.* **4**, 246 (1861)
Thallus endolithic, medium pinkish grey to grey-brown. Perithecia almost completely immersed in the substratum, 0.25–0.45 mm wide, leaving pits in the rock following their decay, lacking an involucrellum, only the dull black apex visible, this flush with the substratum or slightly convex, 0.15–0.22 mm wide; excipulum blackish brown. Spores hyaline, 1-septate, 8 per ascus, 25–40 × 10–17 μm.

This calcicolous lichen was previously known from Europe, North America, North Africa and Central Asia (Orange 2009).

SPECIMENS EXAMINED
New South Wales: • Mount Kosciuszko Natl Park, Cooleman Plain, Blue Waterholes, rocky knoll overlooking Nichols Gorge Track, 35°37′35″S, 148°41′03″E, alt. 1210 m, on exposed limestone, 11.xii. 2013, *P.M. McCarthy 4164, 4167*, 11.xii.2013 (CANB); Mount Kosciuszko Natl Park, Cooleman Plain, Blue Waterholes, Caves Track, 35°37′35″S, 148°41′00″E, alt. 1186 m, sheltered limestone cliff overlooking narrow valley, *P.M. McCarthy 4239*, 11.xii.2013 (CANB).

Key to *Thelidium* in Australia (after McCarthy 2001)

1 Spores 3(–4)-septate, 30–60 × 14–22 μm. Perithecia 0.3–0.75 mm diam. [N.S.W., Tas., Vic.].....**T. papulare**
1: Spores 1-septate.....2

2 Thallus aquatic, epilithic, pale to medium greenish brown. Perithecia 0.24–0.41 mm diam., partly overgrown by the thallus [Tas.].....**T. pluvium**
2: Thallus not aquatic.....3

3 Perithecia 0.18–0.26 mm diam., semi-immersed to almost superficial. Thallus rimose to areolate, dark olive-brown. Spores 19–25 × 9–12 μm [Vic.] .....**T. olivaceum**
3: Perithecia 0.25–0.45 mm diam., immersed. Thallus endolithic, inconspicuous..... Spores 25–40 × 10–17 μm [N.S.W.].....**T. decipiens**

3. Verrucaria fusconigrescens Nyl., *Bull. Soc. Linn. Normandie*, sér. 2, 6: 313 (‘1872’) [1873]
In Australia this species was previously known only from Tasmania (McCarthy 2014). It also occurs in Europe, Turkey, North America and Taiwan.

SPECIMEN EXAMINED
South Australia: • Eyre Peninsula, Marble Range, 28 km SW of Cummins, 34°25′S, 135°30′E, alt. 400 m, on quartz in rocky ridge with scattered scrub, *J.A. Elix 41767*, 22.ix.1994 (CANB).

4. Verrucaria hochstetteri Fr., *Lichenogr. Eur. Reform.* 435 (1831)
This species is already known from South Australia and Victoria (McCarthy 2014). It also occurs throughout much of Europe and in North Africa and Taiwan.

SPECIMEN EXAMINED
New South Wales: • Central Tablelands, *c.* 70 km S of Bathurst, Abercrombie Karst Conservation Reserve, Grove Creek Falls Track, 33°54′52″S, 149°21′31″E, alt. *c.* 530 m, shaded limestone outcrops on grassy slope of gorge, *P.M. McCarthy 4319*, 31.iii.2014 (CANB).

5. Verrucaria papillosa Ach., *Lichenogr. Universalis* 286 (1810)
In Australia this lichen is known from Tasmania (McCarthy 2014); also in Great Britain, Sweden, Switzerland, the Pyrenees, Italy, southern Siberia and south-western U.S.A. (Arizona and California).

SPECIMEN EXAMINED
New South Wales: • Mount Kosciuszko Natl Park, Cooleman Plain, Blue Waterholes, rocky knoll overlooking Nichols Gorge Track, 35°37′35″S, 148°41′03″E, alt. 1210 m, on exposed limestone, *P.M. McCarthy 4164 p.p.*, 11.xii.2013 (CANB).

Acknowledgements
Several specimens were collected during a Bush Blitz survey of the southern A.C.T. and nearby areas of alpine and subalpine N.S.W. co-funded by the Australian Government and BHP Billiton. I am grateful to Othmar Breuss, Cécile Gueidan and Kerry Knudsen for their comments on the *Placopyrenium*, and to Jack Elix for his company and assistance in the field.

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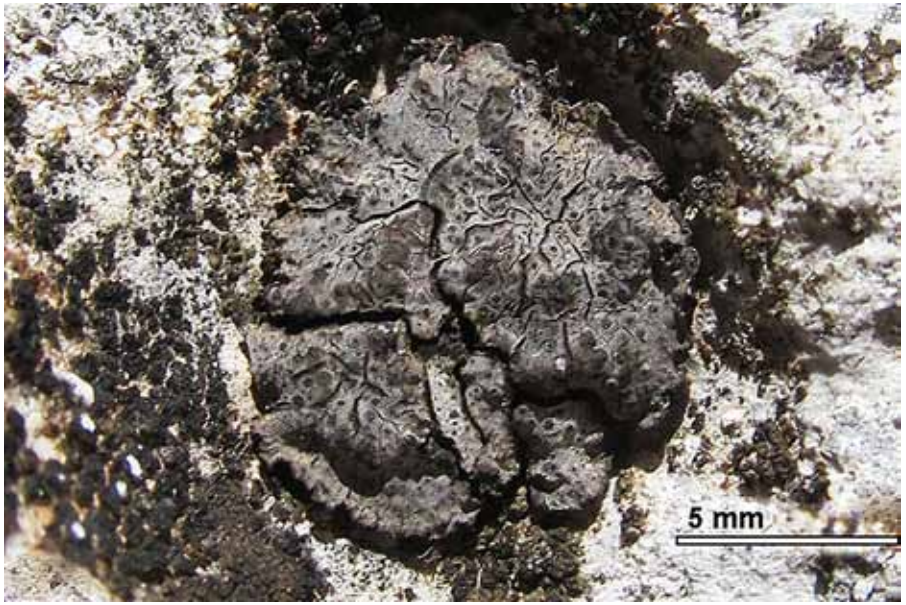

Fig. 1. *Placopyrenium trachytichum* var. *trachytichum*, *P.M. McCarthy 4318* (CANB).

Additional lichen records from Australia 78.
***Tylophorella pyrenocarpoides* (Müll.Arg.) Egea**
(Ascomycota: Arthoniales *incertae sedis*)

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Abstract: The crustose mazaedium-forming lichen genus *Tylophorella* is reported for the first time from Australia.

Tylophorella polyspora was described as a new genus and species based on two collections from Colombia and Venezuela (Vainio 1890). Egea and Tibell (1993) showed that *Opegrapha pyrenocarpoides* Müll.Arg. from Venezuela is an earlier synonym, and also reported *T. pyrenocarpoides* from Kenya. The species has been collected as well in the Galápagos Islands (Bungartz *et al*. 2013). That distribution suggests that *T. pyrenocarpoides* is Pantropical but rare.

Because *T. pyrenocarpoides* forms a mazaedium, the genus *Tylophorella* was originally placed in the order Caliciales by Vainio (1890), but currently the correct placement of the genus is considered uncertain. Lumbsch *et al.* (2009) placed *Tylophora*, which *Tylophorella* superficially resembles, in the Arthoniales and tentatively in the Arthoniaceae. The spores of *Tylophoron* are one-septate and hyaline, whereas those of *Tylophorella* and some other taxa in the Arthoniales are 7–10 transversely septate and brown, and tend to fragment. Zahlbruckner's (1923) transfer of *Opegrapha pyrenocarpoides* to the genus *Lecanactis* is consistent with a place in the Arthoniales. The genus *Bactrospora*, which was segregated from *Lecanactis* and placed in the Opegraphaceae by Egea & Torrente (1993), also has fragmenting spores, but does not form a mazaedium.

Tylophorella pyrenocarpoides (Müll.Arg.) Egea, *Nordic Journal of Botany* **13**, 207 (1993) [MB 360806]

Opegrapha pyrenocarpoides Müll.Arg. *Flora* (Regensburg) **63**, 284 (1880) [MB 396622]
Type: Venezuela, Merida, near Caracas, 8°40'N, 71°20'W, 2200–2250 m. Dr Ernst, 1878. Holotype (G 248606/1), Isolectotype (G 248608/1).
Lecanactis pyrenocarpoides (Müll.Arg.) Zahlbr. *Catalogus Lichenum Universalis* **2,** 544 (1923) [MB 387313]
Tylophorella polyspora Vain. *Acta Societatis pro Fauna et Flora* Fennica **7**, 174 (1890) [MB 408055]

Thallus crustose, corticolous, white to pale grey, continuous or cracked, ecorticate. Ascomata orbicular, 0.4–0.5 mm diameter, sessile; thalline tissue surrounding the lower part of the ascocarp, upper portion of the ascocarp proper, black; ascomatal disc black. Hymenium covered by a mazaedium on the upper surface. Hamathecium of reticulate hyphae. Asci clavate, initially thick-walled at the apex, becoming thinner with age, lacking an apical apparatus, 8-spored. Ascospores 7–10 transversely septate, 21–30 × 4–5 μm, hyaline initially but becoming brown while maturing within the ascus, later released from the ascus into a mazaedium where the spores fragment into globular unicells 3.5–4.5 μm in diameter, which then variously aggregate. Lacking all secondary chemical products. Photobiont *Trentepohlia*.

SPECIMEN EXAMINED
Queensland: • Fife Island, 13°39'S, 143°41'E, on bark of *Cordia subcordata. E. Youman s.n.* 21.vii.1985 (BRI 686995).

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Additional lichen records from Australia 79

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Phaeophyscia adiastola (Essl.) Essl. and *Rinodina olivaceobrunnea* C.W.Dodge & G.E.Baker are reported as new to Australia. In addition, new State or Territory records are listed for 40 other taxa.

New records for Australia

1. Phaeophyscia adiastola (Essl.) Essl., *Mycotaxon* **7**, 293 (1978)
This species was previously known from North America, East and South Africa and New Zealand (Esslinger 1977; Galloway 2007). It is characterized by the sublinear to linear lobes, coarsely granular to isidioid soredia that are located in irregularly delimited, marginal or terminal soralia and by the absence of lichen substances. *Phaeophyscia orbicularis* (Neck.) Moberg is similar, but differs in having more finely granular soredia located in roundish, laminal and submarginal soralia, and generally has shorter and more rounded lobes (Esslinger 1977). A detailed description is given in Esslinger (1977) and Galloway (2007).

SPECIMEN EXAMINED
New South Wales: • Warrumbungles National Park, Split Rock Track, 36 km W of Coonabarabran, 31°16′49″S, 148°58′42″E, 430 m alt., on *Callitris* in *Eucalyptus-Callitris* woodland, *J.A. Elix 45496*, 12.v.2005 (CANB).

2. Rinodina olivaceobrunnea C.W.Dodge & G.E.Baker, *Ann. Missouri Bot. Gard.* **25**, 659 (1938)
This bipolar species was known previously from northern Europe, Greenland, central Africa, Antarctica, the Subantarctic islands and New Zealand (Galloway 2007). It is characterized by the muscicolous habit, the inconspicuous, brown to grey-brown thallus, small, lecanorine apothecia 0.2–0.7 mm wide and *Physcia*-type ascospores 16–30 × 6–13 μm, and the irregular presence of zeorin and pannarin. Detailed descriptions are given in Mayrhofer & Moberg (2002) and Galloway (2007).

SPECIMEN EXAMINED
Tasmania: • Bass Strait, Albatross Island, in central gully S of mouth of North Cave, 40°22′S, 144°39′E, on dead mosses in grassland, *S.R. Gilmore L12*, 10.ix.2002 (CANB).

New state and territory records

1. Amandinea occidentalis Elix & Kantvilas, *Australas. Lichenol.* **72**, 9 (2013)
This Australian endemic was previously known from Western Australia (Elix & Kantvilas 2013a).

SPECIMEN EXAMINED
New South Wales: • Galoon Creek, Wadbilliga National Park, 20 km WSW of Cobargo, 36°27′S, 149°39′E, 220 m alt., on *Acacia* stem in forest with *Tristania laurina, Acacia mearnsii*, *Eucalyptus saligna* and *E. botryoides*, *D.J. Boland 1888D,* 14.ii.1983 (CANB).

2. Buellia aethalea (Ach.) Th.Fr., *Lichenogr. Scand.* **2**, 604 (1874)
In Australia this cosmopolitan species was previously recorded for Western Australia, South Australia, Queensland, New South Wales and Tasmania (McCarthy 2014).

SPECIMENS EXAMINED
Australian Capital Territory: • Brindabella Range, Mt Aggie, 37 km SW of Canberra, 35°28′S, 148°48′E, 1490 m alt., on large exposed rock outcrop surrounded by *Eucalyptus pauciflora* woodland, *H. Streimann 15302,* 31.iii.1981 (B, CANB, H, US); • *loc. id., D. Verdon 1034*, 31.iii.1981 (CANB); • Blue Range, 2 km E of Devils Peak, 26 km W of Canberra, 35°16′S, 148°51′E, 1220 m alt., on weathered hypabyssal rock in scattered *Phebalium lamprophyllum* community, *D. Verdon 4990A, 4991A,* 1.ix.1981 (CANB).
Victoria: • Alpine National Park, Mt McKay, 16 km SSE of Mt Beauty, 36°52′S, 147°14′E, 1840 m alt., on granite rocks in exposed subalpine grassland, *J.A. Elix 40502 pr.p.* & *H. Streimann*, 18.ii.1994 (CANB).

3. Buellia amandineaeformis Elix & Kantvilas, *Australas. Lichenol.* **73**, 24 (2013)
This Australian endemic was previously known from Tasmania (Elix & Kantvilas 2013b).

SPECIMEN EXAMINED
Australian Capital Territory: • Mt Tennant, 28 km SSW of Capital Hill, Canberra, 35°34′S, 149°04′E, 1370 m alt., on sheltered rock in dry sclerophyll ridge top dominated by huge granite boulders, *H. Streimann 38913,* 22.x.1987 (CANB).

4. Buellia bogongensis Elix, *Australas. Lichenol.* **65**, 10 (2009)
This Australian endemic was previously known from Victoria and Tasmania (McCarthy 2014).

SPECIMENS EXAMINED
Australian Capital Territory: • summit of Bimberi Peak, Bimberi Range, 49 km S of Canberra, 35°39′S, 148°47′E, 1910 m alt., on large boulder in alpine grassland and stunted, sparse *Eucalyptus pauciflora* woodland, *J.A. Elix 6605, H. Streimann 9709,* 11.xii.1979 (CANB).

5. Buellia demutans (Stirt.) Zahlbr., *Cat. Lich. Univ.* **7**, 348 (1931)
In Australia this species is known from Western Australia, South Australia, Queensland, New South Wales, Victoria and Tasmania (McCarthy 2014). It also occurs in South Africa, South America, New Zealand and the Pacific (Hawai'i and New Caledonia).

SPECIMENS EXAMINED
Lord Howe Island: • along track to Mutton Bird Point, 31°32′45″S, 159°05′E, 60 m alt., on dead canopy branches in dry lowland forest, *J.A. Elix 32784,* 21.vi.1992 (CANB); • Valley of Shadows, 31°31′45″S, 159°04′45″E, 40 m alt., on fallen canopy branches in dry lowland forest, *J.A. Elix 32850,* 22.vi.1992 (CANB); • near pier, 31°31′31″S, 159°03′30″E, 2 m alt., on old fence post, *J.A. Elix 42352,* 7.ii.1995 (B, CANB).

6. Buellia dissa (Stirt.) Zahlbr., *Cat. Lich. Univ.* **7**, 357 (1931)
In Australia this species is known from Western Australia, South Australia, New South Wales, Victoria and Tasmania (Elix 2009; McCarthy 2014). It also occurs in South Africa (Elix 2009).

SPECIMEN EXAMINED
Queensland: • Girraween National Park, 7 km NE of Wallangarra, 28°53′07″S, 151°57′52″E, 990 m alt., on *Callitris* in dry *Eucalyptus-Callitris* woodland, *J.A. Elix 43134,* 3.v.2005 (CANB).

7. Buellia epigaella Elix & Kantvilas, *Australas. Lichenol.* **73**, 26 (2013)
This Australian endemic was previously known from Queensland (Elix & Kantvilas 2013b).

SPECIMENS EXAMINED
South Australia: • Mt Lofty Ranges, 15 km E of Eden Valley along the Pine Hut Road, 34°37′S, 139°11′E, 305 m alt., on soil in pasture, *J.A. Elix 3898,* 9.ix.1977 (CANB).
New South Wales: • 10 km N of Gilgandra along Highway 39 (Newell Highway), 31°38′30″S, 148°44′E, on soil in open *Eucalyptus* woodland, *J.A. Elix 2325,* 16.viii.1976 (CANB).

8. Buellia homophylia (C.Knight) Zahlbr., *Cat. Lich. Univ.* **7**, 366 (1931)
This Australian endemic is known from all States and Territories (McCarthy 2014).

SELECTED SPECIMENS EXAMINED
Lord Howe Island: • between Little Island and The Cross, 31°34′18″S, 159°04′30″E, 120 m alt., on basalt rocks amongst large boulders with scattered large *Ficus*, small shrubs and ferns, *J.A. Elix 42287, 42305, 42335,* 7.ii.1995 (B, CANB); • Rocky Run Creek, 31°33′20″S, 159°05′33″E, 35 m alt., on basalt rocks beside broad rocky stream in lowland forest, *J.A. Elix 42488,* 10.ii.1995 (B, CANB, H, NY).

9. Buellia inturgescens Müll.Arg., *Hedwigia* **31**, 197 (1892)
This endemic species was previously known from Northern Territory and South Australia (McCarthy 2014).

SPECIMENS EXAMINED
New South Wales: • Lachlan Range State Forest, 15 km NW of Rankins Springs, 33°47′S, 146°07′E, 260 m alt., on quartzite rocks in *Callitris*-dominated forest, *J.A. Elix 25190,* 12.vi.1990 (CANB); • Mootwingee turnoff on road to Tibooburra, 50 km NNE of Broken Hill, 31°12′S, 141°45′E, 250 m alt., on rock outcrop amongst sparse, semi-desert shrubs, *H. Streimann 6352,* 28.ix.1978 (CANB).

10. Buellia kimberleyana Elix, *Australas. Lichenol.* **65**, 11 (2009)
This endemic Australian species was previously known from Western Australia, Northern Territory and Queensland.

SPECIMENS EXAMINED
South Australia: • Flinders Ranges, lower slopes of Mt Remarkable, Melrose, 32°50′S, 138°11′E, 500 m alt., on sandstone rocks in open *Eucalyptus* woodland, *J.A. Elix 17757 & L.H. Elix,* 26.x.1984 (CANB).
New South Wales: • Goobang National Park, Ten Mile Creek, 1.5 km SSW of Ginghams Gap, 32°49′56″S, 148°20′11″E, 430 m alt., on sandstone in open *Eucalyptus-Callitris* woodland, *J.A. Elix 39357,* 4.viii.2008 (CANB); • Tinderry Mountains, 9 km ESE of Michelago, 35°45′S, 149°16′E, 1200 m alt., on exposed rock with scattered *Leptospermum*, *H. Streimann 36308,* 26.vi.1986 (CANB); • Southern Tablelands, Wadbilliga River Gorge, 41 km ESE of Cooma, 36°18′S, 149°37′E, 675 m alt., on chert rock in moist gully with *Bursaria lasiophylla* and *Lomatia myricoides*, *D. Verdon 2462,* 13.vii.1976 (CANB).
Victoria: • *c.* 8 km S of Benalla on Benalla–Mansfield road, 36°36′S, 145°57′E, on small quartz stone on edge of road in open *Eucalyptus* forest, *L.A. Craven 1939 & C.L. Gunn,* 20.viii.1971 (CANB).

11. Buellia mamillana (Tuck.) W.A.Weber, *Mycotaxon* **27**, 493 (1986)
In Australia this species is known from Western Australia, Northern Territory, Queensland and New South Wales (McCarthy 2014). It also occurs in North, Central and South America, southern Africa, India and Norfolk Island.

SPECIMENS EXAMINED
Lord Howe Island: • Goat House Cave, at base of Mt Lidgebird escarpment, 31°33′50″S, 159°05′15″E, 420 m, on basalt in moist subtropical rainforest with *Dracophyllum* and *Cyathea*, *J.A. Elix 42158*, 7.ii.1995 (CANB); • between Little Island and The Cross, 31°34′18″S, 159°04′30″E, 120 m alt., on basalt rocks amongst large boulders with scattered large *Ficus*, small shrubs and ferns, *J.A. Elix 42286,* 7.ii.1995 (CANB); • Boat Harbour, 31°33′40″S, 159°05′50″E, 3 m alt., on basalt rocks along foreshore in disturbed lowland vegetation with palms, *J.A. Elix 42465* (CANB), *42466,* 10.ii.1995 (B, CANB).

12. Buellia ocellata (Flot.) Körb., *Syst. Lich. Germ.* 224 (1855)
This species is known from Europe, North America, Macaronesia, Asia and Africa; in Australia, it was previously recorded from New South Wales, Victoria and Tasmania (Elix & Kantvilas 2013b).

SELECTED SPECIMENS EXAMINED
South Australia: • Mt Lofty Ranges, 8 km E of Springton, 34°40′S, 139°10′E, 300 m alt., on schist rocks in pasture, *J.A. Elix 2778,* 15.xii.1976 (CANB).
Australian Capital Territory: • Brindabella Range, summit of Mt Aggie, 43 km WSW of Canberra, 35°28′S, 148°46′E, 1490 m alt., on schist rocks on exposed summit, *J.A. Elix 11622 & P.W. James,* 21.i.1984 (CANB); • Naas Creek, 57 km S of Canberra, 35°49′S, 148°56′E, 1160 m alt., on rock on creek bank in *Eucalyptus pauciflora* woodland, *D. Verdon 1683,* 18.viii.1975 (CANB).

13. Buellia parastata (Nyl.) Zahlbr., *Cat. Lich. Univ.* **7**, 386 (1931)
This species is known from North, Central and South America, Africa, Asia and the Pacific (New Caledonia), and in Australia from Queensland (Elix 2009; McCarthy 2014).

SPECIMEN EXAMINED
New South Wales: • c. 6 km N of Glen Martin, S of Dungog, 32°29′S, 151°50′E, 100 m alt., on wood, *H. Mayrhofer 8861, D. Mayrhofer, M. Mayrhofer & S. Filson,* 15.viii.1988 (CANB).

14. Buellia poimenae Elix & Kantvilas, *Australas. Lichenol.* **73**, 29 (2013)
This endemic species was previously known from Tasmania and New South Wales (Elix & Kantvilas 2013b).

SPECIMEN EXAMINED
Victoria: • Mt William, Grampians National Park, 29 km W of Ararat, 37°18′S, 142°36′E, 1020 m alt., on semi-exposed rock amongst stunted *Eucalyptus* with dense understorey, *H. Streimann 55604,* 2.x.1994 (B, CANB).

15. Buellia spuria var. **amblyogona** (Müll.Arg.) Elix, *Australas. Lichenol.* **65**, 16 (2009)
This endemic taxon was previously known from Western Australia, Northern Territory, Queensland and New South Wales (Elix 2011; McCarthy 2014).

SELECTED SPECIMENS EXAMINED
South Australia: • Flinders Ranges, Warren Gorge, 18.5 km N of Quorn, 32°11′S, 138°00′E, 400 m alt., on quartzite rocks in ravine with *Eucalyptus camaldulensis*, *J.A. Elix 17787* (B, CANB), *17792 & L.H. Elix,* 27.x.1984 (CANB).
Lord Howe Island: • track to Kims Lookout, 31°30′59″S, 159°03′12″E, 180 m alt., on basalt rocks in stunted lowland forest, *J.A. Elix 42366,* 9.ii.1995 (CANB).
Australian Capital Territory: • Kowen Forest, 16 km E of Canberra, 35°15′S, 149°16′E, 700 m alt., on sandstone rocks in open *Eucalyptus* woodland, *J.A. Elix 33207,* 16.viii.1992 (CANB); • Orroral River and Nursery Creek Divide, 41 km SSW of Canberra, 35°41′S, 148°58′E, 1150 m alt., on boulder on ridge in *Eucalyptus* woodland, *H. Streimann 31426,* 7.x.1984 (B, CANB, US).
Victoria: • Mt Egbert, 17 km NNW of Wedderburn, 36°18′S, 143°41′E, 220 m alt., on exposed boulder in *Acacia* and *Eucalyptus* regrowth, *H. Streimann 59317,* 8.xii.1996 (B, CANB, H, NY); • Northern Plains region, Euroa-Strathbogie Road, 9 km E of Euroa, 36°49′S, 145°38′E, 200 m alt., on semi-shaded boulder in sparse, dry disturbed sclerophyll forest, *H. Streimann 63507,* 15.iii.1999 (B, CANB, H).

16. Buellia stellulata (Taylor) Mudd, *Man. Brit. Lich.*: 216 (1861) var. **stellulata**
In Australia this cosmopolitan species is known from Western Australia, South Australia, Queensland, New South Wales, Lord Howe Island and Victoria (McCarthy 2014).

SPECIMENS EXAMINED
Tasmania: • South Arm, 43°01′S, 147°25′E, on mudstone just above high tide, *G.C. &*

M.H. Bratt 271, 23.vi.1963 (HO); • Blackmans Bay, 43°00′S, 147°19′E, on sandstone, *M.L. Westbrook 71/1330*, vii.1971 (HO).
Norfolk Island: • Philip Island, Upper Long Valley, 29°07′30″S, 167°57′E, 40 m alt., on volcanic rocks in the open, *J.A. Elix 18495 pr.p. & H. Streimann*, 4.xii.1984 (CANB).

17. Buellia stellulata var. **tasmanica** Elix & Kantvilas, *Australas. Lichenol.* **73**, 32 (2013)
This endemic taxon was previously known from Tasmania (Elix & Kantvilas 2013b).

SPECIMEN EXAMINED
New South Wales: • Tathra Head, 15 km SE of Bega, 36°44′S, 149°58′E, 20 m alt., on exposed siliceous rock on rocky heathy headland dominated by *Melaleuca, Myoporum* and *Boronia*, *H.T. Lumbsch 8606d & H. Streimann*, 16.vi.1991 (CANB).

18. Caloplaca bermaguiana S.Y.Kondr. & Kärnefelt, *in* Kondratyuk *et al.*, *Biblioth. Lichenol.* **95**, 348 (2007)
This Australian endemic was previously known from Western Australia, New South Wales, and Tasmania (McCarthy 2014).

SPECIMEN EXAMINED
Lord Howe Island: • junction of tracks to Mutton Bird Point and Intermediate Hill, 31°32′43″S, 159°04′48″E, 35 m alt., on basalt rocks in lowland forest beside broad, rocky stream, *J.A. Elix 32756*, 21.vi.1992 (CANB).

19. Canoparmelia owariensis (Asahina) Elix, *Mycotaxon* **47**, 127 (1993)
In Australia this species is known from Western Australia, Northern Territory and Queensland (McCarthy 2014). It also occurs in Africa and Asia.

SPECIMEN EXAMINED
New South Wales: • Long Beach, 3 km E of Batemans Bay, 35°42′S, 150°13′E, 5 m alt., on *Elaeodendron australe* in remnant rainforest, *J.A. Elix 10938*, 28.v.1983 (CANB).

20. Dirinaria flava (Müll.Arg.) C.W.Dodge, *Beih. Nova Hedwigia* **38**, 181 (1971)
In Australia this species is known from Queensland and New South Wales (McCarthy 2014). It also occurs in Africa and Ascension Island (South Atlantic Ocean).

SPECIMEN EXAMINED
Australian Capital Territory: • Gudgenby River Gorge, 4.5 km S of Tharwa, 35°44′S, 149°04′E, 650 m alt., on moist granite rocks in open *Eucalyptus woodland*, *J.A. Elix 6350*, 26.viii.1979 (CANB).

21. Flavoparmelia soredians (Nyl.) Hale, *Mycotaxon* **25**, 605 (1986)
In Australia this species occurs in Western Australia, South Australia, New South Wales, Victoria and Tasmania (McCarthy 2014). It also occurs in Europe and North America.

SPECIMEN EXAMINED
Australian Capital Territory: • Molonglo Gorge Reserve, 16 km SE of Canberra, 35°19′46″S, 149°14′59″E, 700 m alt., on sheltered slate rocks in dry *Eucalyptus-Callitris* woodland with numerous rock outcrops, *J.A. Elix 33204A*, 16.viii.1992 (CANB).

22. Gyalectaria jamesii (Kantvilas) I.Schmitt, Kalb & Lumbsch, *in* Schmitt *et al.*, *Mycology* **1**, 81 (2010)
In Australia this species was previously known from New South Wales, Victoria and Tasmania (McCarthy 2014). It also occurs in New Zealand and South America.

SPECIMEN EXAMINED
Australian Capital Territory: • Namadgi National Park, Scabby Range, headwaters of Cotter River, 54 km SSW of Capital Hill, 35°45′S, 148°51′E, 1660 m alt., on *Leptospermum* trunk in dense *Leptospermum* thicket along creek, *J.A. Curnow 4252*, 11.iii.1992 (CANB). Det. P.M. McCarthy.

23. Halecania subsquamosa (Müll.Arg.) van den Boom & Mayrhofer, *Australas. Lichenol.* **60**, 32 (2007)
In Australia this species is known from Western Australia, South Australia, New South Wales, Australian Capital Territory, Victoria and Tasmania (McCarthy 2014). It also occurs in South America.

SPECIMENS EXAMINED
Queensland: • Leichhardt Highway, Isla Gorge National Park, 26 km NNE of Taroom, 25°10′S, 150°01′E, 320 m alt., on sandstone rocks in disturbed *Eucalyptus* woodland on steep slope, *J.A. Elix 35197* (CANB), *35212*, 31.viii.1993 (CANB, GZU).

24. Hertelidea eucalypti Kantvilas & Printzen, *in* Printzen & Kantvilas, *Biblioth. Lichenol.* **88**, 545 (2004)
This endemic species was previously known from Tasmania and Victoria (McCarthy 2014).

SPECIMEN EXAMINED
New South Wales: • Cottan-Bimbang National Park, junction of Oxley Highway and Tobins Road, *c.* 70 km E of Walcha, 31°22′22″S, 152°03′37″E, 1040 m alt., on base of *Eucalyptus* in wet *Eucalyptus* forest with tree fern understorey, *J.A. Elix 43114*, 6.viii.2008 (CANB).

25. Hyperphyscia adglutinata (Flörke) H.Mayrhofer & Poelt, *Herzogia* **5**, 62 (1979)
In Australia this cosmopolitan species was previously known from South Australia, Queensland, New South Wales, Victoria and Tasmania (McCarthy 2014).

SPECIMEN EXAMINED
Western Australia: • farm off South Coast Highway, 7 km SW of Denmark, 34°59′S, 117°17′E, 60 m alt., on leaves of large *Camelia* in planted garden, *J.A. Curnow 4815 & H. Lepp*, 18.ix.1994 (CANB, HO, PERTH).

26. Lecidella enteroleucella (Nyl.) Hertel, *Khumbu Himal* **6**, 330 (1977)
This species is known from Africa, Asia, North and South America and in Australia from Queensland (McCarthy 2014).

SPECIMEN EXAMINED
Lord Howe Island: • Goat House Cave, at base of Mt Lidgebird escarpment, 31°33′50″S, 159°05′15″E, 420 m alt., on basalt in moist subtropical rainforest with *Dracophyllum* and *Cyathea*, *J.A. Elix 42153*, 7.ii.1995 (CANB).

27. Lecidella granulosula (Nyl.) Knoph & Leuckert, *in* Knoph, *Biblioth. Lichenol.* **14**, 9 (2000)
In Australia this cosmopolitan species was previously known from South Australia, New South Wales and Tasmania (McCarthy 2014).

SPECIMENS EXAMINED
Australian Capital Territory: • Shepherds Lookout above Murrumbidgee River, 15.5 km W of Canberra, 35°15′S, 148°58′E, 560 m alt., on porphyry rocks on dry hillside with scattered *Callitris endlicheri*, *J.A. Elix 26711*, 10.iv.1992 (CANB).
Victoria: • Mt Eccles, rim of volcano, 38°04′S, 141°55′E, on basalt, *W.H. Ewers 69*, 11.x.1986 (CANB).

28. Lecidella montana Kantvilas & Elix, *Muelleria* **31**, 40 (2013)
This endemic species was previously known from Tasmania (Kantvilas & Elix 2013).

SPECIMEN EXAMINED
New South Wales: • Mount Kosciuszko National Park, Charlottes Pass, 36°27′S, 148°20′E, 1840 m alt., on base of dead *Eucalyptus* in open *Eucalyptus pauciflora* stand, *D. Verdon 3268*, 9.ii.1978 (CANB).

29. Notoparmelia crowii (Elix) A.Crespo, Ferencova & Divakar, *Lichenologist* **46**, 62 (2014)
This endemic species was previously known from New South Wales (McCarthy 2014).

SPECIMEN EXAMINED
Queensland: • near summit of Mt Leswell, 32 km S of Cooktown, 15°46′S, 145°15′E, 440 m alt., on granite rocks in *Eucalyptus*-dominated woodland, *J.A. Elix 17371 & H. Streimann*, 5.vii.1984 (CANB).

30. Notoparmelia pseudotenuirima (Gyeln.) A.Crespo, Ferencova & Divakar, *Lichenologist* **46**, 62 (2014)
This Australian endemic was previously known from South Australia, New South Wales, Australian Capital Territory and Victoria (McCarthy 2014).

SPECIMENS EXAMINED
Western Australia: • Darling Plateau, Boyagin Rock Reserve, 10 km W of Pingelly, 32°28′S, 116°53′E, 350 m alt., on *Eucalyptus caesia* on granite monolith, *J.A. Elix 10564 & L.H. Elix*, 21.x.1982 (CANB); • Darling Plateau, 10 km W of Kojonup, 33°50′S, 117°08′E, on granite rocks in open *Eucalyptus* woodland, *J.A. Elix 10593 & L.H. Elix*, 22.x.1982 (CANB, PERTH); • Ludlow Tuart Reserve, 8 km E of Busselton, 33°35′S, 115°28′E, on dead wood in open *Eucalyptus* forest, *J.A. Elix 10742 & L.H. Elix*, 26.x.1982 (CANB).

31. Opegrapha vulgata (Ach.) Ach., *Methodus*, 20 (1803)
In Australia this cosmopolitan species was previously known from Victoria (McCarthy 2014).

SPECIMENS EXAMINED
South Australia: • Yorke Peninsula, Salt Creek Bay, just S of Coolbowie, 35°03′28″S, 137°45′50″E, 4 m alt., on *Acacia* twigs in remnant coastal woodland with limestone outcrops, *J.A. Elix 45928* (AD, CANB), *45933*, 11.iv.2013 (CANB).

32. Phaeophyscia endococcinodes (Poelt) Essl., *Mycotaxon* **7**, 301 (1978)
This species was previously known from Africa, Asia and New Zealand, and in Australia from Western Australia, Queensland, New South Wales and Tasmania (McCarthy 2014).

SPECIMEN EXAMINED
Victoria: • Ben Nevis, Mount Cole State Forest, 24 km ESE of Ararat, 37°13′S, 143°12′E, 820 m alt., on large, shaded boulder in *Eucalyptus* forest, *H. Streimann 55379*, 5.x.1994 (CANB, UPS).

33. Phaeophyscia fumosa Moberg, *Nordic J. Bot.* **3**, 514 (1983)
This species was previously known from East Africa (Moberg 1983) and in Australia from New South Wales (McCarthy 2014).

SPECIMEN EXAMINED
Queensland: • Palmerston Highway, 5 km E of Ravenshoe, 17°37′S, 145°32′E, 1010 m alt., on treelet stem in remnant *Syzygium* and *Euodia*-dominated vegetation, *H. Streimann 46173*, 8.xii.1990 (CANB).

34. Protoparmelia isidiata Diederich, Aptroot & Sérus., *in* Aptroot *et al.*, *Biblioth. Lichenol.* **64**, 146 (1997)
This species was previously known from Papua New Guinea, and in Australia from Queensland and Northern Territory (McCarthy 2014).

SPECIMEN EXAMINED
New South Wales: • Barren Grounds Nature Reserve, 17 km E of Robertson, 34°40′20″S, 150°42′45″E, 630 m alt., on old stump in *Eucalyptus* woodland and heath, *J.A. Elix 45607*, 16.ix.2008 (CANB).

35. Rhizocarpon reductum Th.Fr., *Lichenogr. Scand.* **2**, 633 (1874)
This cosmopolitan species was previously known from New South Wales, the Australian Capital Territory and Victoria (McCarthy 2014).

SPECIMENS EXAMINED
Western Australia: • 55 km NW of Mount Barker along Muir Highway, 10.7 km S of Rocky Gully, 34°30′55″S, 117°07′35″E, on sheltered wet stone in open forest, *R.J. Cranfield 16666*, 20.vii.2001 (CANB); • 10.8 km W of Wagelup Road from Railway Crossing, Thornton Forest Block, 34°07′17″S, 116°03′26″E, on sheltered wet stone in *Eucalyptus* forest, *R.J. Cranfield 18049*, 16.v.2002 (CANB).
Queensland: • Girraween National Park, 7 km NE of Wallangarra, 28°53′07″S, 151°57′52″E, 990 m alt., on granite rocks in dry *Eucalyptus-Callitris* woodland, *J.A. Elix 43167*, 3.v.2005 (BRI, CANB).

36. Rinodina australiensis Müll.Arg., *Hedwigia* **32**, 123 (1893)
In Australia this species is known from Western Australia, South Australia, New South Wales, Victoria and Tasmania (Elix 2011; McCarthy 2014). It also occurs in New Zealand.

SPECIMEN EXAMINED
Northern Territory: • Mt Brockman complex, 15 km SSE of Jabiru airfield, 12°48′S, 132°56′E, 230 m alt., on dead tree trunk in *Allosyncarpia*-dominated vegetation amongst deeply dissected sandstone outcrops, *H. Streimann 42300*, 20.iv.1989 (CANB).

37. Rinodina oxydata (A.Massal.) A.Massal., *Geneac. Lich.*: 19 (1854)
This species was previously known from Asia, Europe, North and South America, southern Africa, New Zealand and Norfolk Island, and in Australia from Western Australia, Northern Territory, Queensland, New South Wales, Victoria and Tasmania (Kaschik 2006; McCarthy 2014).

SPECIMENS EXAMINED
Lord Howe Island: • junction of tracks to Mutton Bird Point and Intermediate Hill, 31°33′20″S, 159°03′33″E, 35 m alt., on basalt rocks in lowland forest beside broad, rocky stream, *J.A. Elix 32756A*, 21.vi.1992 (CANB); • along track to Mutton Bird Point, 31°32′45″S, 159°05′E, 60 m alt., on basalt rocks in dry lowland forest, *J.A. Elix 32818*, 21.vi.1992 (CANB).

38. Rinodina ramboldii Kaschik, *Biblioth. Lichenol.* **93**, 105 (2006)
In Australia this species is known from Northern Territory, Queensland and Victoria (Elix 2011; McCarthy 2014). It also occurs in the Juan Fernandez Islands (Kaschik 2006).

SPECIMEN EXAMINED
South Australia: • Yorke Peninsula, Corny Point lighthouse, 34°53′49″S, 137°00′38″E, 2 m alt., on gneiss rocks at base of seaside cliffs, *J.A. Elix 45919*, 11.iv.2013 (AD, CANB).

39. Rinodina substellulata Müll.Arg., *Proc. Roy. Soc. Edinburgh* **11**, 461 (1882)
This species is known from Central America, West Africa, South Africa and Indonesia,

and in Australia from Queensland (Elix 2011; McCarthy 2014).

SPECIMEN EXAMINED
Victoria: • Mt Egbert, 17 km NNE of Wedderburn, 36°18′S, 143°41′E, 220 m alt., on semi-exposed granite boulder in *Acacia* and *Eucalyptus* regrowth, *H. Streimann 59271,* 8.xii.1996 (CANB).

40. Rinodina xanthomelana Müll.Arg., *Nuovo Giorn. Bot. Ital.* 23: 390 (1891)
In Australia this species was known previously from Western Australia, Queensland and Lord Howe Island. It also occurs in Indonesia and Taiwan (Elix 2011; McCarthy 2014).

SPECIMEN EXAMINED
New South Wales: • North Coast, below Waihow Trig Station, 25 km NW of Coffs Harbour, 30°06′S, 153°02′E, 340 m alt., on sandstone outcrop in closed *Tristania-Ficus* forest, *D. Verdon 3805,* 12.x.1978 (CANB).

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Coenogonium fruticulosum, a new isidiate species from New Zealand

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Abstract: *Coenogonium fruticulosum* L.Ludw. *sp. nov.* (Coenogoniaceae) is characterized by frequently branched coralloid isidia, and is reported from several localities in New Zealand.

Coenogonium fruticulosum L.Ludw., sp. nov. Figs 1–13
Mycobank No. MB 808248

Type: Knight's Bush, Tuapeka West, Otago, New Zealand, 45°54′47″S, 169°29′31″E, *c.* 80 m, on base of kanuka tree, *L. Ludwig*, 13.x.2013 (holotype — OTA 063962; isotype — Herb. Allison Knight).

Description:
Primary thallus crustose, pale greenish grey, smooth and thin, giving rise to isidia and apothecia, evanescent in densely isidiate parts of the thallus, where only a whitish mesh of hyphae is visible among the isidia. The thallus encrusts the substratum in patches up to 15 cm across, but usually only a few centimetres. Prothallus absent. *Isidia* densely coralloid, green to orange, up to 1 mm tall, 25–50 µm in diam., of irregular shape, branching dichotomously multiple times, constricted at short intervals, resulting in a granular appearance, often forming a turf that obscures the primary thallus, or aggregated into tiny cushions. *Photobiont* a green alga; cells round to irregular-ellipsoid, 7–13 µm diam., forming short chains or clumps inside isidia, ?*Trentepohlia*. *Apothecia* sessile on primary thallus (not on isidia), constricted at base, usually 0.5–1.5 mm diam., 0.3–0.4 mm high; disc orange (never brown or red), concave to rarely flat or slightly convex; *proper exciple* smooth to crenulate (but never isidiate), usually paler than disc, ranging from almost concolorous with disc to much paler yellow, paraplectenchymatous in cross section. *Hymenium* colourless, *c.* 70–90 µm thick, I+ hemiamyloid reaction of hymenial gel with Lugol's iodine solution (in water rusty reddish brown, but blue in 10% KOH; see Baral 2009 for terminology). *Asci* cylindrical, *c.* 60–70 × 4–5 µm, I– (in both water and KOH). *Spores* 8 per ascus, uniseriate, colourless, ellipsoid, 1-septate (but often with pseudoseptae and appearing 3-septate), (6–)7–10(–11) × 2–3 µm. *Paraphyses* unbranched, colourless, 1–1.5 µm diam.; apex swollen 3–5 µm diam., apex separated by a septum and a few more septa along cylindrical portion of paraphyses. Subhymenium yellowish. Hypothecium colourless. *Pycnidia* not seen.
Chemistry: Thallus and apothecia K–, C–, KC–, P–, UV–.

Etymology: the epithet is a diminutive of Latin *fruticosus* meaning shrubby or bushy, in reference to the often branched coralloid isidia.

Variability
The species exhibits a considerable range of variability in several characters, not only among different specimens but within the same thallus, which I therefore do not consider to be of any taxonomic importance for comparison with other species. The primary crustose thallus can be present, e.g. in the holotype (OTA 063962, Figs 1–4), but it often vanishes (e.g. OTA 063963, Figs 6–11), usually where it is densely overgrown by isidia. The colour of the isidia seems to depend on exposure to sunlight, ranging from green where shaded to orange where more exposed (Figs 6–8). The apothecial margin varies from smooth to crenulated, and its coloration from pale yellowish (almost white) to deep orange and almost concolorous with the disc. The species is also rather variable with regard to its substratum. It grows on bark, rotting tussock bases and bryophytes or detritus, but it has not been observed growing on leaves.

Ecology and distribution
The new species has been collected from localities in Otago (South Island) and Hawkes Bay (North Island) (see details below), where it grows in native lowland forests (on bark), subalpine grassland (on rotting tussock bases), and montane shrubland (on bryophytes and detritus). All known sites have rather low direct light incidence due to shading by vegetation and aspect.

The specimen from Hawkes Bay (OTA 062514) is very small, and has been identified with some doubt because its isidia are very poorly developed (Fig. 13). It was collected in the course of the Department of Conservation TIER1 biodiversity monitoring program.

Comparison with related species
According to Rivas Plata *et al.* (2006) and Kalb (2007), eight isidiate species of *Coenogonium* are known: *C. disciforme* Papong, Boonpr. & Lücking, *C. isidiiferum* (Lücking) Lücking, *C. isidiigerum* (Vězda & Osorio) Lücking, Aptroot & Sipman, *C. isidiosum* (Breuss) Rivas Plata, Lücking, Umaña & Chaves, *C. isidiatum* (G.Thor & Vězda) Lücking, Aptroot & Sipman, *C. coralloideum* Kalb and two as yet undescribed species from Brazil called "Spec. A" and "Spec. B" in Rivas Plata *et al*. (2006), referring to "Kalb, pers. comm. 2000". None of those species has been recorded for New Zealand, and their type specimens have not been examined by the author.

Coenogonium disciforme and *C. isidiiferum* are readily distinguished from the new species by having disc-shaped isidia and a foliicolous habit (Lücking 1999, Papong *et al*. 2007).

Coenogonium isidiigerum has much larger spores (20–24 µm long), a slightly taller hymenium (90–100 µm), shorter and thicker isidia (0.3 mm long, 0.1 mm wide) and a white prothallus (Vězda 1989, as *Dimerella isidiigera*).

Coenogonium isidiosum differs in having simple to rarely branched isidia with slightly thickened tips, smaller apothecia (up to 0.5 mm wide) and biseriate spores (Breuss 2002, as *Dimerella isidiosa*). As Breuss states, *C. isidiosum* was described from only one very small collection. As a result, its full range of variability remains unknown, and a direct comparison of *C. fruticulosum* and the type and/or additional collections of *C. isidiosum* would be desirable.

Coenogonium isidiatum differs in having slightly larger spores (9–14 × 3–4 µm) and rarely branched, smaller isidia (0.2–0.4 mm tall), which are covered with colourless papilla-like projections (Thor & Vězda 1984, as *Dimerella isidiata*).

Coenogonium coralloideum from Australia differs from the new species in having unbranched white-tipped isidia, slightly longer, biseriate ascospores (12–15 µm long) and a whitish prothallus (Kalb 2007).

The undescribed Brazilian "Spec. A" has longer spores (15–18 µm), whereas "Spec. B" has "isidia in dense cushions, branched, up to 0.7 mm long" ('Kalb pers. comm. 2000' in Rivas Plata *et al.* 2006, p. 302). Therefore *C. fruticulosum* might be closely related to "Spec. B". However, the latter also has slightly broader spores (3–4 µm), and the disc colour is orange-red. Furthermore Prof. K. Kalb agrees that the new species is "very different from all isidiate species I know" (K. Kalb, pers. comm. 2011, translated from German).

Additional specimens examined (paratypes):
NEW ZEALAND, South Island, *Otago*: • Swampy Summit, Dunedin, 45°47′18.8″S, 170°28′23.2″E, 660 m, *L. Ludwig*, 11.vi.2011 (OTA 063963); • Swampy Summit, Dunedin, 45°47′23.9″S, 170°28′29.1″E, 700 m, *L. Ludwig*, 16.x.2011 (OTA 063964); • "Organ

Pipes", Mt Cargill area, near Dunedin, 45°48′30.1″S, 170°34′00.9″E, 570 m, *L. Ludwig*, 12.v.2013 (OTA 063965).
North Island, *Hawkes Bay*: • Hoodoo Creek, Ngaruroro River catchment, 39°23′40″S, 176°17′17″E, 715 m, on litter in indigenous forest, *A. Pritchard & A. Lawson*, 6.iii.2013, DoC TIER1 program plot-ID CY75, specimen-ID NV131402774 (OTA 062514).

Acknowledgments
I am grateful to Dr David Galloway (Dunedin, New Zealand) for providing a copy of Vězda (1989) with the original description of *Dimerella isidiigera*. For confirmation that the species described here is new, I thank Dr Robert Lücking (Chicago, U.S.A.) and Prof. Klaus Kalb (Neumarkt, Germany). For her hospitality and comments on the draft manuscript, I thank Dr Allison Knight (Dunedin, New Zealand). For supplying the Hawkes Bay specimen, I am grateful to the non-vascular plants team of the TIER1 biodiversity monitoring program of the Department of Conservation. I gratefully acknowledge funding by a University of Otago Doctoral Scholarship.

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Thor, G; Vězda, A (1984): Einige neue oder bemerkenswerte Flechten mit gyalectoiden Apothecien von Nord-Indien und Nepal. *Folia Geobotanica et Phytotaxonomica* **19**, 71–82.
Vězda, A (1989): Lichenes Selecti Exsiccati, editi ab Instituto Botanico Academiae Scientiarum Cechoslovacae, Pruhonice prope Pragam. *Fasc. XCIV* (*no. 2326–2350*). *VII. 1989*, 7 pp.

Fig. 1. *Coenogonium fruticulosum* habit (holotype, OTA 063962).

Fig. 2. *Coenogonium fruticulosum* habit (holotype, OTA 063962).

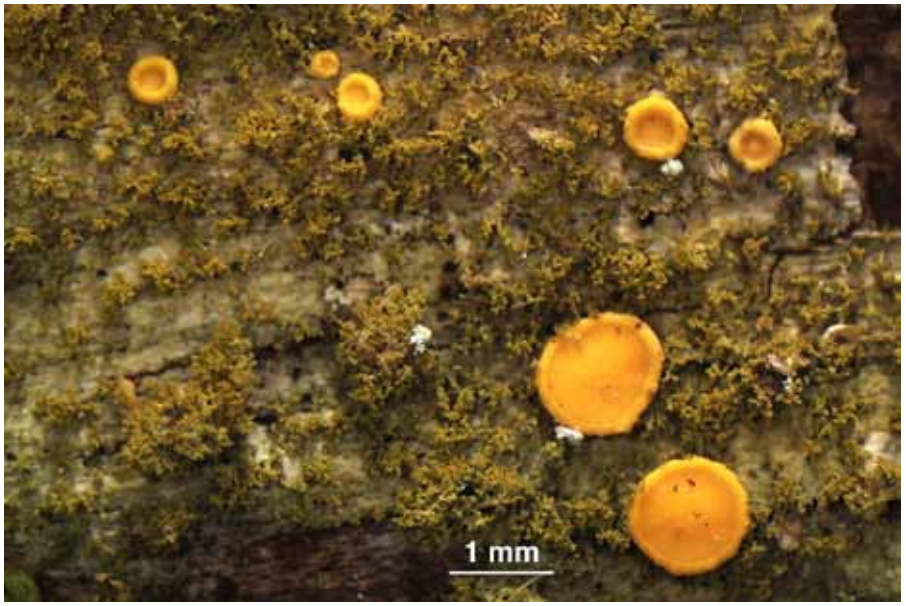

Fig. 3. *Coenogonium fruticulosum* habit (holotype, OTA 063962).

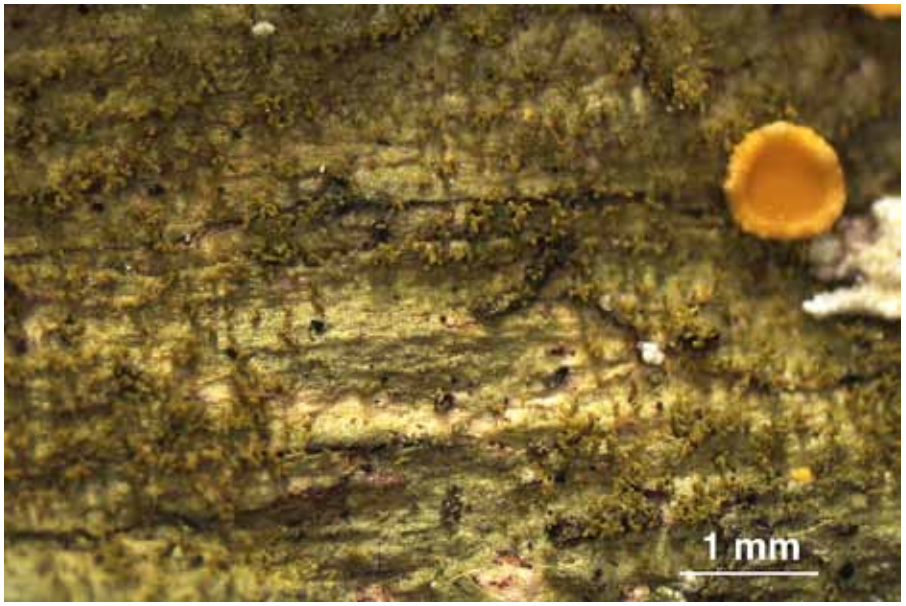

Fig. 4. *Coenogonium fruticulosum,* view of fewer and shorter isidia, emphasizing the well-developed crustose thallus (holotype, OTA 063962).

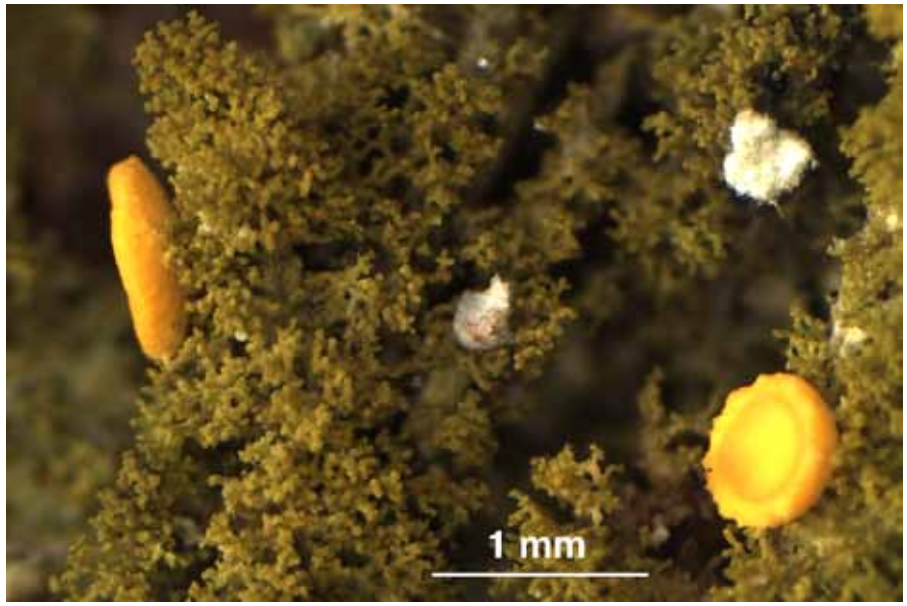

Fig. 5. *Coenogonium fruticulosum,* portion of holotype OTA 063962, illustrating the orange coralloid isidia.

Fig. 6. Swampy Summit specimen growing on rotting base of tussock (OTA 063963).

Fig. 7. Swampy Summit specimen growing on rotting base of tussock (OTA 063963).

Fig. 8. Swampy Summit specimen growing on rotting base of tussock (OTA 063963).

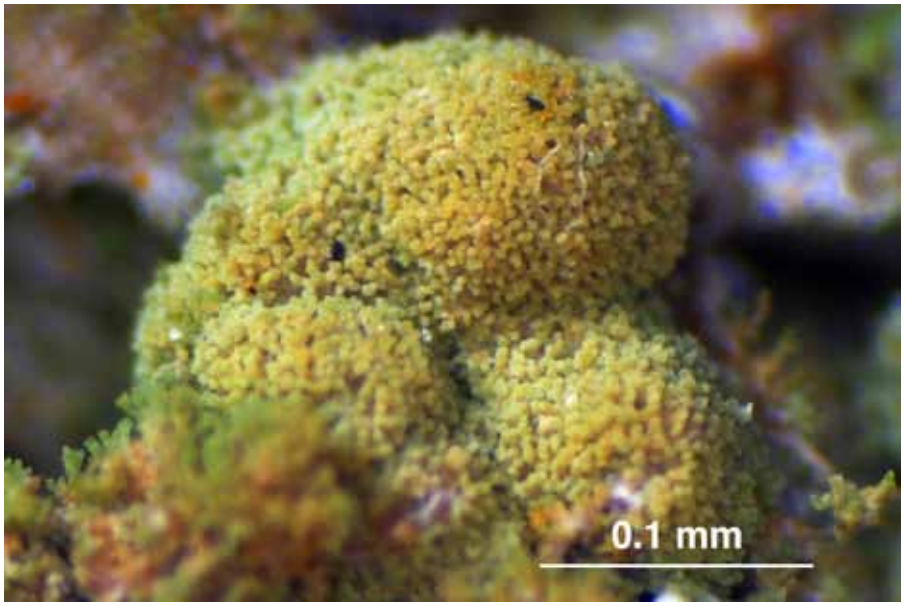

Fig. 9. *Coenogonium fruticulosum,* caespitose aggregation of isidia.

Fig. 10. *Coenogonium fruticulosum,* greenish isidia and apothecia with paler rim.

Fig. 11. *Coenogonium fruticulosum,* greenish isidia and apothecia with paler rim.

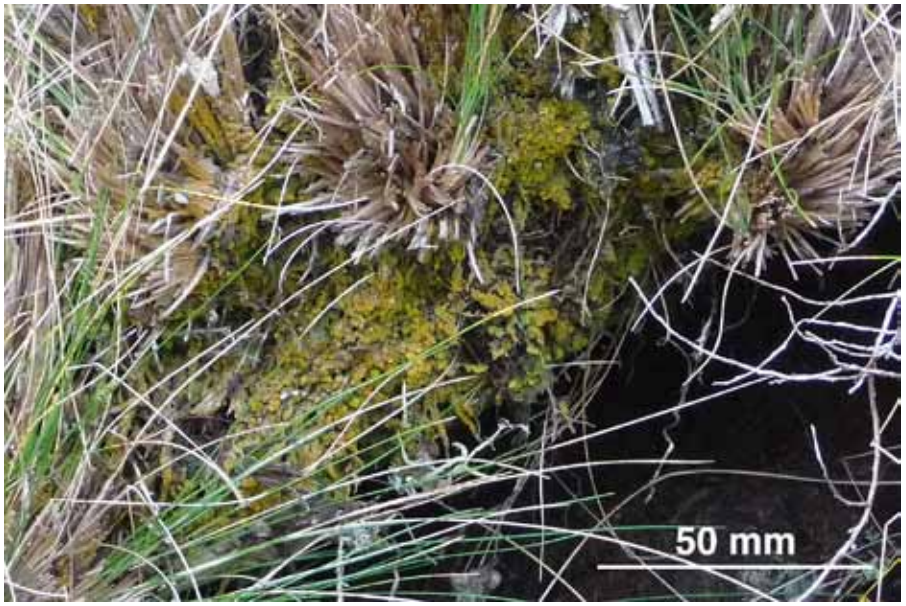

Fig. 12. *Coenogonium fruticulosum,* large patch growing on rotting tussock bases in subalpine grassland on Swampy Summit, the OTA 063963 collection site.

Fig. 13. *Coenogonium fruticulosum,* a depauperate specimen from Hawkes Bay, North Island, with few and short isidia but with spore dimensions identical to those of the holotype (OTA 062514).

New species and new records of the lichen genus *Baculifera* (Physciaceae, Ascomycota) in Australia

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Abstract
Baculifera epifuscescens Elix & Kantvilas, *B. macromera* Elix & Kantvilas and *B. metaphragmioides* Elix & Kantvilas are described as new to science. *Buellia microsporella* Elix is found to be synonymous with *Baculifera xylophila* (Malme) Marbach, and that species is reported as new to Queensland. The new combination *Baculifera metaphragmia* (C.Knight) Elix & Kantvilas is made, and *B. intermedioides* Marbach, *B. micromera* (Vain.) Marbach, *B. orosa* Marbach & Kalb and *B. pseudomicromera* Marbach are reported as new to Australia.

We continue our investigation of buellioid lichens in Australia, which has included the first account of the family (Elix 2011) and additions and revisions to *Amandinea* (Elix & Kantvilas 2013a), *Buellia sens. lat.* (Elix & Kantvilas 2013b) and *Buellia sens. str.* (Elix & Kantvilas 2014). In this paper, we deal with the species of *Baculifera* which are characterized by bacilliform conidia (4–)8–11(–14) µm long and a non-inspersed hymenium (Marbach 2000). The superficially similar *Buellia sens. str.* is distinguished from *Baculifera* by having short, bacilliform or weakly clavate conidia and a hymenium usually inspersed with oil droplets. In this paper, we describe three species new to science, report four new records of *Baculifera* for Australia, and provide a key to the Australian species.

Material and methods
The study is based on collections and observations of the authors, and on other herbarium specimens held in the Tasmanian Herbarium (HO) and the Australian National Herbarium (CANB). Observations of thallus and apothecial anatomy were made on hand-cut sections mounted in water, 15% KOH and 50% HNO_3. Chemical constituents were identified by thin-layer chromatography (Elix & Ernst-Russell 1993), high-performance liquid chromatography (Elix *et al.* 2003) and comparison with authentic samples. Nomenclature of ascus types follows Hafellner (1984). Nomenclature of pigments follows Meyer & Printzen (2000), Marbach (2000) and Bungartz *et al.* (2007). The *micromera*-green pigment was described by Bungartz *et al.* (2007) as being greenish brown and reacting K+ greenish yellow, K followed by HCl + bluish green, N+ black, whereas Etayo *et al.* (2010) describe that pigment as dark brown to olivaceous black, reacting N+ blackish, K+ yellowish green and KC+ dark blue-green to blackish. In our experience, its detection can be problematical, especially when in low concentrations. In water mounts, it is seen as olive- or dark greenish brown, reacting N+ dark purplish grey or purplish black which fades on standing; reactions in K, KC and K/HCl can be ambiguous.

The new species

1. Baculifera epifuscescens Elix & Kantvilas, sp. nov. Fig. 1
MB 809823
Baculiferae orosae Marbach & Kalb similis sed atranorinum deficienti et epihymenio hypothecioque K+ atro-fusco reagentibus, ascosporis 15–23 µm longis, 7–12 µm latis, parietibus medialiter subapicaliterque non incrassatis differt.

Type: Australia, New South Wales, Red Rock, 36 km NNE of Coffs Harbour, 29°59′S, 153°14′E, 1 m alt., on *Casuarina* at margin of mangrove swamp, *J.A. Elix 42707*, 19.iv.1998 (holotype – CANB).

Thallus crustose, forming discontinuous patches to *c.* 4 cm wide, white, sordid white or pale yellow-grey, 100–200 µm thick, esorediate; prothallus not apparent; cortex *c.* 10 µm thick; medulla I–; photobiont cells 7–10 µm wide. *Apothecia* 0.2–1.0 mm wide, lecideine, scattered or crowded, subimmersed then broadly adnate; disc black to black-brown, epruinose, weakly concave at first, then ± plane to markedly convex; proper excipulum concolorous with the disc, ± persistent, excluded in older, convex apothecia, black, in section 25–35 µm thick, dark brown to black-brown, paler within, K+ forming red crystals, N–. *Epihymenium* 8–12 µm thick, orange-brown to olive-brown, K+ dark brown to blackish brown, N– (*arnoldiana*-brown). *Hypothecium* 35–50 µm thick, pale orange-brown to brown, K+ dark brown to blackish brown. *Hymenium* 50–75 µm thick, colourless, not inspersed; paraphyses 1–1.5 µm wide, simple to weakly branched, capitate, with apices brown, 3–4 µm wide; asci approximating the *Bacidia*-type, 8-spored but often with fewer spores (6- or 4-spored). *Ascospores* of the *Buellia*-type, 1-septate, olive-green to brown, ellipsoid, 15–23 × 7–12 µm, larger when fewer per ascus, ± constricted at central septum, curved or not, rounded at apices, lacking medial and subapical wall-thickenings; outer spore wall strongly ornamented. *Pycnidia* immersed; conidia bacilliform, straight or rarely slightly curved, 8–13 × 1 µm.
Chemistry: Thallus K+ yellow then red, P+ yellow, C–, UV–; medulla K+ yellow then red, P+ yellow, C–, UV–; containing norstictic acid (major), connorstictic acid (minor).

Etymology: The species name is derived from the Latin *fuscus* (dark, blackish brown) in reference to the reaction of the epihymenium with KOH.

Remarks
This new species is characterized by the crustose, white to sordid white or pale yellow-grey thallus that contains norstictic acid, the presence of *arnoldiana*-brown pigment in the epihymenium and hypothecium, the 1-septate, *Buellia*-type ascospores without medial or subapical wall-thickenings, and the relatively long, bacilliform conidia. As with several *Buellia*-like lichens studied by us (e.g. *Buellia nebulosa, B. testaceina*; Elix & Kantvilas 2013b), the ascus type of *Baculifera epifuscescens* is difficult to interpret. The well-developed, intensely amyloid tholus is penetrated almost entirely by a rather narrow masse axiale with relatively parallel (rather than convergent) flanks and a rounded (rather than acute) apex. *Baculifera orosa* from Central America, and reported here for the first time from Australia, has similar sized ascospores and conidia, but differs in having a K– epihymenium and hypothecium, ascospores with medial and subapical wall thickenings and predominantly 8-spored asci, and in containing additional atranorin. Furthermore, the apothecia of *B. orosa* often have whitish pruinose discs, whereas those of *B. epifuscescens* are epruinose.

Buellia epifuscescens is known from bark in lowland and coastal forests in Queensland and New South Wales. Associated species include *Buellia demutans* (Stirt.) Zahlbr., *Canoparmelia texana* (Tuck.) Elix & Hale, *Cratiria aggrediens* (Stirt.) Marbach, *C. melanochlora* (Kremp.) Marbach, *Punctelia subflava* (Taylor) Elix & J.Johnst. and *Usnea dasaea* Stirt.

ADDITIONAL SPECIMEN EXAMINED
Queensland: • Baralaba–Woorabinda road, State Forest 212, 50 km S of Duaringa, 24°10′S, 149°38′E, 190 m alt., on lower stem of *Callitris* in *Eucalyptus-Callitris*-dominated woodlands on flats, *H. Streimann 52544*, 29.viii.1990 (B, CANB).

2. Baculifera macromera Elix & Kantvilas, sp. nov. Fig. 2
MB 809824
Baculiferae micromerae (Vain.) Marbach similis sed ascis 4–8-sporis et ascosporis grandioribus, (12–)16–30 μm longis, (5–)7–12 μm latis, pariete laevi differt.

Type: Australia, Tasmania, summit of Table Mountain, 42°14′S, 147°08′E, 1095 m alt., on twigs of dead eucalypts in low woodland, *G. Kantvilas 938/01*, 6.x.2001 (holotype – HO).

Thallus crustose, smooth, indistinctly areolate, uneven to occasionally verruculose, white to pale grey or greenish grey, esorediate, 0.5–6.5 cm wide, to 150 μm thick; prothallus marginal and black or not apparent; cortex *c.* 10 μm thick; medulla white, I–; photobiont cells 8–16 μm wide. *Apothecia* 0.1–0.7 mm wide, lecideine, scattered or crowded, broadly adnate; disc black, epruinose, weakly concave at first, then ± plane to weakly convex; proper excipulum concolorous with the disc, persistent, in section 35–50 μm thick, dark red-brown to black-brown, N+ weak red-brown, paler within. *Epihymenium* 8–20 μm thick, dark olive-brown to dark brown, K–, N–. *Hypothecium* 75–140 μm thick, dark brown to dark red-brown. *Hymenium* 50–100 μm thick, colourless, not inspersed; paraphyses 1.8–2.0 μm wide, simple to weakly branched, capitate, with apices dark red-brown, 3–5 μm wide; asci approximating the *Bacidia*- to *Lecanora*-types, 4–8-spored. *Ascospores* of the *Buellia*-type, olive-green to brown, ellipsoid to broadly fusiform, (12–)16–30 × (5–)7–12 μm, usually 1-septate but with older spores rarely becoming 3-septate, ± constricted at central septum and developing pointed apices and moderate subapical wall-thickenings; outer spore wall smooth. *Pycnidia* immersed; conidia bacilliform, straight, 5–6 × 1 μm.
Chemistry: Thallus K+ yellow or K–, P+ pale yellow or P–, C–, UV–; containing atranorin (minor or trace).

Etymology: The epithet reflects the similarity of this species to *B. micromera*, highlighting its larger ascospores.

Remarks
This new species is characterized by the thin, white to pale grey or greenish grey thallus containing atranorin, the non-inspersed hymenium, the 4–8-spored asci, and the 1-septate, *Buellia*-type ascospores with moderate subapical wall-thickenings and a smooth outer wall. As with *B. epifuscescens*, the ascus type is rather equivocal: the masse axiale has a rounded apex and parallel flanks, and it penetrates the tholus ± entirely. *Baculifera macromera* is most similar to *B. micromera*, which also contains atranorin, but differs in having an epihymenium containing *micromera*-green, 8-spored asci and smaller ascospores (12–17 × 5–7 μm) with a strongly ornamented outer wall. *Baculifera macromera* could also be confused with *B. xylophila*, but *B. xylophila* lacks lichen substances, has 8-spored asci, smaller ascospores (12–22 × 5–9 μm) and an epihymenium containing *micromera*-green pigment.

Baculifera macromera is known only from Tasmania, where it has a wide ecological amplitude, having been recorded from coastal sclerophyllous woodland, cool temperate rainforest, upland eucalypt forest and high-altitude scrubby woodland. It colonizes twigs and young branches. Associated species, gleaned from examination of herbarium specimens, reflect its variable habitat ecology and include *Austroparmelina pseudorelicina* (Jatta) A.Crespo, Divakar & Elix, *Caloplaca* spp., *Candelariella xanthostigmoides* (Müll.Arg.) R.W.Rogers, *Coccotrema cucurbitula* (Mont.) Müll.Arg., *Haematomma nothofagi* Kalb & Staiger, *Menegazzia subpertusa* P.James & D.J.Galloway, *M. subtestacea* Kantvilas, *Pertusaria pertractata* Stirt., *Ramboldia laeta* (Stirt.) Kalb, Lumbsch & Elix, *Rinodina asperata* (Shirley) Kantvilas, *Usnea inermis* Motyka and *U. oncodes* Stirt.

ADDITIONAL SPECIMENS EXAMINED
Tasmania: • Five-Road, Florentine Valley, 42°43′S, 146°26′E, 450 m alt., on *Atherosperma moschatum* in rainforest, *G. Kantvilas 239/81*, 10.iv.1981 (HO); • Pelion Plains, 1 km W of Pelion Hut, 41°50′S, 146°02′E, 890 m alt., on twigs of *Cyathodes parvifolia* in open *Eucalyptus delagatensis* forest, *G. Kantvilas 245/92*, 11.iii.1992 (HO); • Cape Contrariety, 43°01′S, 147°31′E, 50 m alt., on dead *Allocasuarina verticillata* on cliff edge overlooking the sea, *G. Kantvilas 184/98*, 25.ix.1998 (HO); • Renard Point, 42°54′S, 147°40′E, 10 m alt., on *Allocasuarina verticillata* in littoral woodland, *G. Kantvilas 272/06*, 28.vi.2006 (HO); • Bisdee Tier, 42°26′S, 147°17′E, 640 m alt., on *Acacia dealbata* in rocky grassland, *G. Kantvilas 275/09*, 22.iv.2009 (HO).

3. Baculifera metaphragmioides Elix & Kantvilas, sp. nov. Fig. 3
MB 809825
Baculiferae metaphragmiae similis sed acidum norsticticum continenti et ascosporis aliquantum magnioribus, 16–30 μm longis, 7–14 μm latis differt.

Type: Australia, Tasmania, Skullbone Plains, 42°02′S, 146°19′E, 1000 m alt., on twigs of *Richea acerosa* in open heathland, *G. Kantvilas 176/12*, 29.ii.2012 (holotype – HO).

Thallus crustose, endophloedal or forming a discontinuous, whitish or pale grey membranaceous film to 200 μm thick, esorediate; prothallus absent or marginal and forming a very thin black line at the periphery of the thallus; cortex *c.* 10 μm thick; medulla white, I–; photobiont cells 8–18 μm wide. *Apothecia* 0.2–1.5 mm wide, lecideine, broadly adnate, scattered or crowded and distorted by mutual pressure; disc black, epruinose, weakly concave at first, then ± plane to weakly convex; proper excipulum concolorous with the disc, persistent, in section 25–35 μm thick, dark brown to black-brown, N+ red-brown, paler within. *Epihymenium* 8–25 μm thick, dark brown to olive-brown, K–, N+ weak red-brown, sometimes with aeruginose flecks. *Hypothecium* 70–150 μm thick, yellow brown to dark brown. *Hymenium* 70–100 μm thick, colourless, not inspersed; paraphyses 2–2.5 μm wide, simple to weakly branched, capitate, with apices dark brown, 4–5 μm wide; asci approximating the *Bacidia*- to *Lecanora*-types, 3–8-spored. *Ascospores* of the *Callispora*-type, 1–3-septate, olive-green to brown, ellipsoid to broadly fusiform, highly variable in size, 16–30 × 7–14 μm, largest when fewer per ascus, constricted at central septum, rarely slightly curved, often pointed at apices, with strong subapical wall thickenings; outer spore wall smooth. *Pycnidia* immersed; conidia bacilliform, straight, 5–8 × 1 μm.
Chemistry: Thallus K+ yellow then red, P+ yellow, C–, UV–; medulla K+ yellow then red, P+ yellow, C–, UV–; containing norstictic acid (major), connorstictic acid (minor). Spot or squash tests can be unreliable when the thallus is thin and norstictic acid is in very low concentrations.

Etymology: The specific epithet derives from the Greek suffix '*-oides*' (having the form of), and refers to the close resemblance to *B. metaphragmia*.

Remarks
This new species is characterized by the endophloedal or whitish grey thallus containing norstictic acid and the commonly 3-septate, *Callispora*-type ascospores with strong subapical wall-thickenings. So strong are the subapical thickenings that 1-septate ascospores often appear to have bone-shaped lumina in each locule. *Baculifera metaphragmioides* is superficially similar to *B. metaphragmia*, a corticolous species in mainland Australia, with predominantly 8-spored asci, somewhat smaller ascospores (12–23 × 5–10 μm, this study) and lacking lichen substances. *Baculifera metaphragmioides* could also be confused with *Buellia conspirans* (Nyl.) Vain. in that both are corticolous, contain norstictic acid and have ascospores that become 3-septate with age and have strong subapical wall thickenings. However, *B. conspirans* differs

in having invariably 8-spored asci, a hymenium strongly inspersed with oil droplets, and narrower ascospores (6–8 μm wide).

The asci of this species are very distinctive, with a conical to narrowly cylindrical masse axiale that often entirely penetrates the highly thickened tholus; the edge adjacent to the masse axiale can also be slightly more intensely amyloid. Similar asci were observed in two rather unusual species of *Buellia* [*B. nebulosa* Elix & Kantvilas and *B. testaceina* Elix & Kantvilas (see Elix & Kantvilas 2013b)] as well as in *Baculifera epifuscescens*, *B. macromera* and *B. metaphragmia*.

Buellia metaphragmioides is known from bark and dead wood in heathland and sclerophyll forests in Tasmania and Western Australia, ranging from lowland to alpine elevations. In Tasmania, it has been collected commonly on the cut stumps of old eucalypts in regenerating logging coupes about five years after burning. In that habitat, associated species include *Austroparmelina pseudorelicina* (Jatta) A.Crespo, Divakar & Elix, *Caloplaca* spp., *Candelariella xanthostigmoides* (Müll.Arg.) R.W.Rogers, *Lecanora subtecta* (Stirt.) Kantvilas & LaGreca, *Menegazzia subpertusa* P.James & D.J.Galloway, *Micarea intersociella* (Stirt.) Coppins, *Placynthiella icmalea* (Ach.) Coppins & P.James, *Ramboldia sorediata* Kalb, *Rinodina asperata* (Shirley) Kantvilas and *Usnea inermis* Motyka. In alpine habitats it grows on the twigs of heathland shrubs together with *Coccotrema cucurbitula* (Mont.) Müll.Arg., *Fuscidea australis* Kantvilas, *Mycoblastus campbellianus* (Nyl.) Zahlbr. and *Tasmidella variabilis* Kantvilas, Hafellner & Elix.

SELECTED SPECIMENS EXAMINED
Tasmania: • southern shore of Lake Ada, 41°53′S 146°29′E, 1150 m alt., on twigs of *Orites acicularis* in alpine heathland, *G. Kantvilas 419/99*, 14.xii.1999 (HO); • West of Tahune Bridge in the Warra SST, Big Coupe, Plot 372, 43°06′S, 146°41′E, 130 m alt., on old cut stump in regenerating logging coupe, *G. Kantvilas 218/04*, 20.vii.2004 (HO); • West of Tahune Bridge in the Warra SST, Big Coupe – understorey island no. 13, 43°06′S, 146°41′E, 180 m alt., on bark of dead, fire-killed *Eucryphia lucida* in regenerating wet forest, *G. Kantvilas 243/06*, 23.v.2006 (CANB, HO); • Blue Peaks, northern summit, 41°43′S, 146°22′E, 1350 m alt., on dead, rotting wood in alpine heathland, *G. Kantvilas 535/06*, 20.xi.2006 (HO); • Turrana Bluff, 41°46′S, 146°21′E, 1450 m alt., on twigs of *Richea sprenglioides* in alpine heathland, *G. Kantvilas 52/12*, 16.ii.2012 (HO); • Circular Marsh, 41°59′S, 146°29′E, 870 m alt., on *Richea acerosa* in boggy shrubland, *G. Kantvilas 91/14*, 20.ii.2014 (HO).
Western Australia: • unnamed Nature Park, 20 km S of Moora along Gingin road, 3 km E on Bullbarnet Road, 30°41′38″S, 116°12′19″E, 225 m alt., on dead *Acacia* in remnant *Eucalyptus-Acacia* woodland along seasonal creek, *J.A. Elix 37167b*, 2.iv.2006 (CANB).

A new combination

Baculifera metaphragmia (C.Knight) Elix & Kantvilas, comb. nov.
MB 809826
Basionym: ***Lecidea metaphragmia*** C.Knight, *Trans. Linn. Soc. London Bot.* **2**, (1882).
Hafellia metaphragmia (C.Knight) Pusswald, *Australas. Lichenol.* **63**, 5 (2008).
Buellia metaphragmia (C.Knight) Elix, *Fl. Australia* **57**, 660 (2009).
This species is characterized by a whitish to grey-white thallus, 8-spored asci approximating the *Bacidia*- to *Lecanora*-types, a non-inspersed hymenium, relatively small, 1–3-septate ascospores 15–23 × 7–10 μm with pronounced subapical wall thickenings, and the absence of lichen substances. A more recent study of the conidia has confirmed them to be bacilliform, 7–10 × 0.5–1 μm. Those relatively elongate, bacilliform conidia and the non-inspersed hymenium suggest that the species is better accommodated in the genus *Baculifera*.
The species is known from Western Australia, New South Wales and Victoria (Elix 2009, McCarthy 2014).

New records for Australia

1. Baculifera intermedioides Marbach, *Biblioth. Lichenol.* **74**, 130 (2000)
This species was known previously from North, Central and South America and Hawai'i, (Bungartz *et al*. 2007, Marbach 2000). It is characterized by a grey to yellow-brown, verrucose, crustose to subsquamulose thallus that reacts K+ red (indicating the presence of norstictic and connorstictic acids), densely pruinose discs with the pruina concolorous with the thallus, *Buellia*-type ascospores 14–25 × 5.5–9 μm without wall thickenings and with a smooth to weakly ornamented outer spore wall, a non-inspersed hymenium, a pale to dark brown hypothecium, and elongate, bacilliform conidia, 7–11 × 0.5–1 μm. *Baculifera intermedia* Marbach is rather similar, but differs in containing additional atranorin and in having ascospores with a strongly ornamented outer spore wall. A detailed description is given in Marbach (2000) and in Bungartz *et al*. (2007) [as *Buellia intermediodes*], together with a colour photograph.

SPECIMENS EXAMINED
Queensland: • Mt Farrenden, 26 km SSW of Charters Towers, 20°19′S, 146°13′E, 450 m alt., on dwarf tree in dry sclerophyll forest, *J.A. Elix 20608A*, 22.vi.1986 (CANB); • Callide Range, Dawson Highway, 19 km ENE of Biloela, 24°14′S, 150°34′E, 350 m alt., on *Alphitonia* trunk in disturbed dry sclerophyll forest, *J.A. Elix 34835*, 28.viii.1993 (CANB); • Mareeba–Cooktown road, 17 km SSE of Lakeland, 16°01′S, 144°49′E, 500 m alt., on shaded *Eucalyptus* stem among large rock outcrops above creek, surrounded by shrubs, *H. Streimann 46437*, 12.xii.1990 (CANB).

2. Baculifera micromera (Vain.) Marbach, *Biblioth. Lichenol.* **74**, 134 (2000)
This species was known previously from Central and South America as well as southern and eastern Africa (Marbach 2000). It is characterized by a white to pale grey, crustose thallus containing atranorin (K+ yellow), a green to greenish black epihymenium [containing *micromera*-green pigment: K+ greenish, N+ purple-black or grey-black (Bungartz *et al*. 2007)], *Buellia*-type ascospores, 12–17 × 5–7 μm, with weak subapical wall thickenings and a strongly ornamented outer wall, and bacilliform conidia 4–5 × 1 μm. A detailed description is given in Marbach (2000). *Baculifera pseudomicromera* Marbach is rather similar, but differs in containing additional norstictic acid and in having ascospores with a weakly ornamented outer wall, while *B. macromera* (above) has larger ascospores with a smooth wall and lacks the *micromera*-green pigment in the epihymenium.

SPECIMENS EXAMINED
Queensland: • Jondaryan–Mount Tyson road, opposite Oakey Golf Club, 27°23′05″S, 151°36′44″E, 390 m alt., on *Pittosporum* in remnant *Eucalyptus-Pittosporum* woodland, *J.A. Elix 39772*, 5.v.2005 (CANB); • Tully Falls National Park, Charmillin Creek, 10 km S of Ravenshoe, 17°41′09″S, 145°31′34″E, 960 m alt., on canopy branch in remnant montane rainforest, *J.A. Elix 44760*, 7.viii.2006 (CANB).
New South Wales: • Old Macleay River estuary, Stuarts Point, 30°49′S, 153°00′E, 1 m alt., on *Aegiceras corniculatum* in mangrove swamp and strand vegetation, *J.A. Elix 21371 pr.p., 21382*, 19.i.1987 (CANB); • Bermagui Trig Station, 36°25′S, 150°05′E, 15 m alt., on dead treelet in coastal woodland with *Eucalyptus* and *Allocasuarina*, *J.A. Elix 28843*, 16.ix.2005 (CANB); • Tabourie Lake, 8 km SW of Ulladulla, 35°25′S, 150°25′E, 3 m alt., on *Banksia* trunk in *Banksia*-dominated shrubland on sand dune, *H. Streimann 10694*, 28.xii.1980 (CANB); • South Coast, along coastal scenic road, Pedro Swamp, 7 km ESE of Moruya, 35°56′S, 150°10′E, 3 m alt., on dead branches of *Casuarina* in *Casuarina*-dominated woodland, *D. Verdon 2336A* 22.vi.1976 (CANB).

3. Baculifera orosa Marbach & Kalb, *Biblioth. Lichenol.* **74**, 138 (2000)
This species was known previously from Central America (Marbach 2000). It is characterized by a white to grey or pale yellow-brown, crustose thallus containing

atranorin, norstictic and connorstictic acids (K+ red), epruinose or sparsely white pruinose apothecia, *Buellia*-type ascospores, 17–28 × 7–12 µm, with weak medial and subapical wall thickenings and a strongly ornamented outer wall, and bacilliform conidia 8–12 × 0.7–1 µm. A detailed description is given in Marbach (2000). *Baculifera macromera* (above) has similar sized ascospores but with a smooth wall, lacks norstictic acid and has much shorter conidia.

SPECIMEN EXAMINED
Queensland: • Nobby–Pittsworth road, 25 km NW of Nobby, 27°46′45″S, 151°41′53″E, 500 m alt., on dead wood in remnant *Eucalyptus* woodland, *J.A. Elix 39656*, 5.v.2005 (CANB).

4. Baculifera pseudomicromera Marbach, *Biblioth. Lichenol.* **74**, 141 (2000)
This species was known previously from South America and East Africa (Marbach 2000). It is characterized by a white to grey, crustose thallus containing atranorin, norstictic and connorstictic acids (K+ red), epruinose apothecia, an olive-green to greenish black epihymenium (containing *micromera*-green pigment), *Buellia*-type ascospores 14–19 × 6–8 µm, with no or only weak subapical wall thickenings and a smooth or weakly ornamented outer spore wall, and bacilliform conidia 6–8 × 1 µm. A detailed description is given in Marbach (2000).

SPECIMEN EXAMINED
Queensland: • Kelvin Grove, Brisbane, 27°21′S, 153°00′E, 15 m alt., on branch of dead tree in cultivated garden, *J.A. Elix 22616*, 8.vii.1988 (CANB).

A new state record

1. Baculifera xylophila (Malme) Marbach, *Biblioth. Lichenol.* **74**, 148 (2000)
Hafellia microspora Pusswald, *In* J.A.Elix, *Australas. Lichenol.* **60**, 17 (2007).
Buellia microsporella Elix, *Fl. Australia* **57**, 660 (2009).

This species was known previously from South America and Hawai'i (Marbach 2000), and in Australia from Western Australia, South Australia, New South Wales, Australian Capital Territory, Victoria and Tasmania (Elix 2009, McCarthy 2014). It is characterized by a white to grey, crustose thallus lacking lichen substances (K–), the epruinose apothecia, the dark brown, olive-brown to dark olive-green epihymenium (containing *micromera*-green pigment), a non-inspersed hymenium, *Buellia*-type ascospores 12–22 × 6–9 µm, with weak to moderate subapical wall-thickenings and a smooth or weakly ornamented outer spore wall, and bacilliform conidia 8–12 × 1 µm.

SPECIMENS EXAMINED
Queensland: • Leichhardt Highway, 12 km NNW of Taroom, 25°32′S, 149°46′E, 200 m alt., on twigs of *Myoporum* in *Acacia, Myoporum, Geigera*-dominated scrub, *J.A.Elix 35061*, 30.viii.1993 (CANB); • Tin Can Bay, E end of village, c. 55 km NE of Gympie, 25°56′S, 153°01′E, sea level, on mangrove, *H.T. Lumbsch 10996b*, 19.x.1994 (CANB).

Key to *Baculifera* in Australia

1 Ascospores 1–3-septate 2
1: Ascospores 1-septate 3

2 Thallus K+ red; norstictic acid present ..... **B. metaphragmioides**
2: Thallus K–; norstictic acid absent ..... **B. metaphragmia**

3 Thallus K+ red; norstictic acid present 4
3: Thallus K–; norstictic acid absent 7

4 Epihymenium olive-green to greenish black, N+ dark purplish grey or black; apothecia epruinose ..... **B. pseudomicromera**
4: Epihymenium yellow-grey to orange-brown or brown, N–; apothecia pruinose or not 5

5 Atranorin present; apothecia epruinose or sparsely pruinose; ascospores 17–28 × 7–12 µm ..... **B. orosa**
5: Atranorin absent; apothecia pruinose or not; ascospores smaller 6

6 Apothecia epruinose; epihymenium K+ dark brown to blackish brown; ascospores 15–23 × 7–12 µm ..... **B. epifuscescens**
6 Apothecia pruinose; epihymenium K–; ascospores 14–25 × 5.5–9 µm ..... **B. intermedioides**

7 Epihymenium olive-brown to dark brown, N–; ascospores 16–30 × 7–12 µm ..... **B. macromera**
7: Epihymenium olive-brown to dark olive-green, N+ dark purplish grey or black; ascospores 12–22 × 5–9 µm 8

8 Thallus K+ yellow, atranorin present; ascospores 12–17 µm long ..... **B. micromera**
8: Thallus K–, atranorin absent; ascospores 12–22 µm long ..... **B. xylophila**

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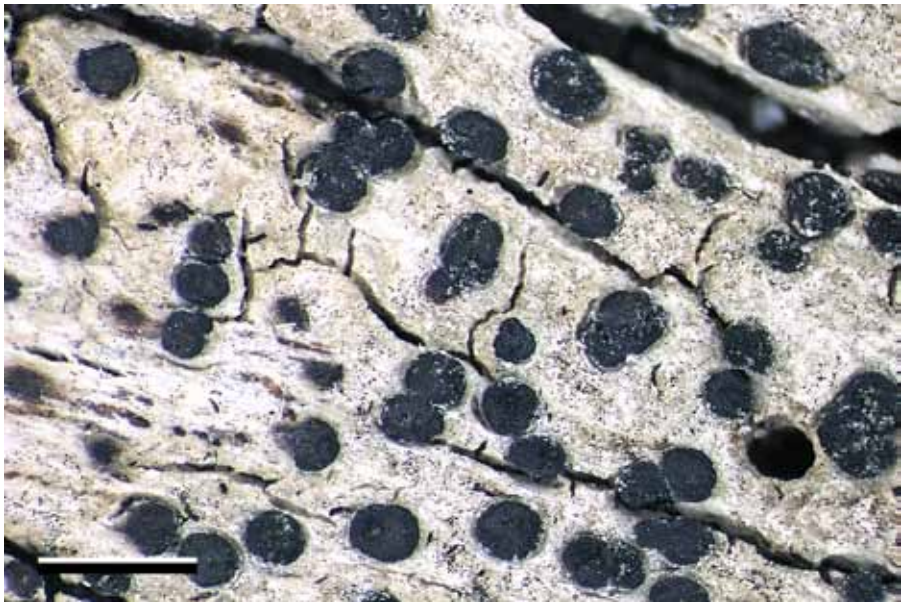

Fig. 1. *Baculifera epifuscescens* (holotype in CANB); scale = 1 mm.

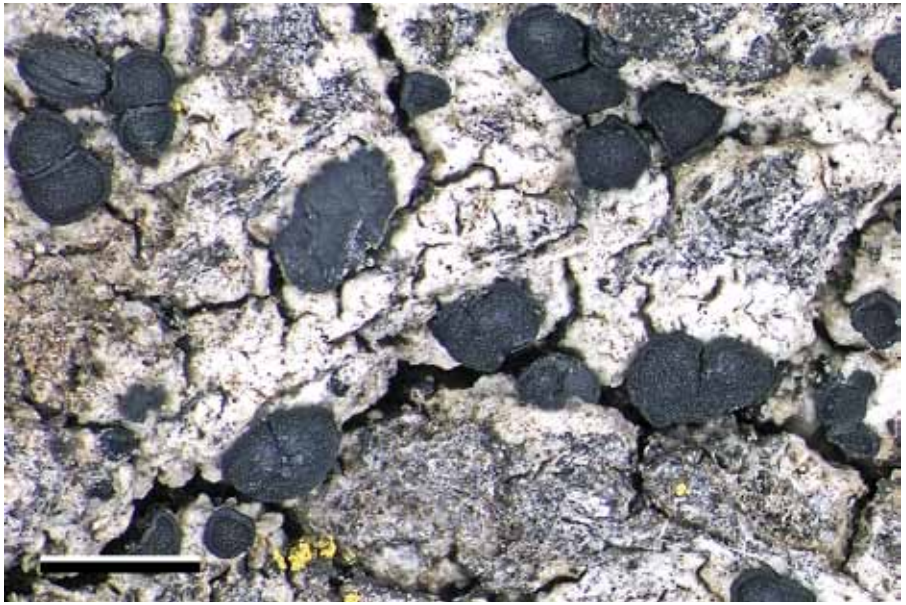

Fig. 2. *Baculifera macromera* (*Kantvilas 272/06* in HO); scale = 1 mm.

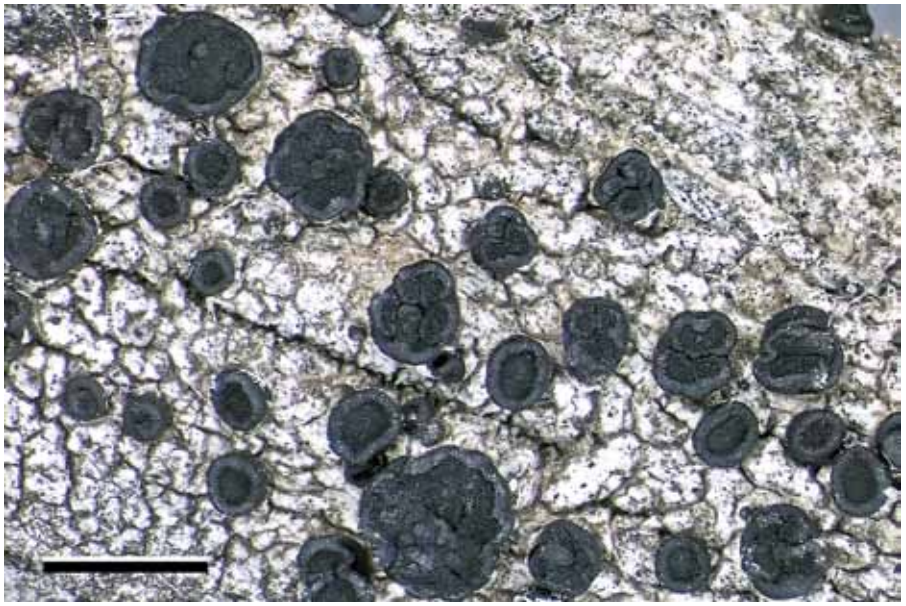

Fig. 3. *Baculifera metaphragmioides* (holotype in HO); scale = 1 mm.

A new species and three new reports of *Pertusaria* in Australia (lichenized Ascomycota, Pertusariaceae)

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Abstract
Pertusaria rogersii A.W.Archer & Elix is described as new to science and compared with similar species. *Pertusaria excludens* Nyl., *P. nebulosa* A.W.Archer and *P. oahuensis* H.Magn. are reported from Australia for the first time.

As part of a continuing study of the lichen genus *Pertusaria* in Australia, some older specimens of questionable identity have been re-examined and found to represent a new species and new records for Australia. A recent collection from the mountains of the southern A.C.T. is also a newly recorded species for Australia.

The chemistry of the specimens was studied by thin-layer chromatography (Elix & Ernst-Russell 1993), high-performance liquid chromatography (Elix *et al.* 2003) and comparison with authentic samples.

The new species

Pertusaria rogersii A.W.Archer & Elix, sp. nov. Fig. 1
MB 807933

Similar to *Pertusaria xanthoplaca* Müll.Arg., but containing thiophaninic and stictic acid.
Type: Australia, *Queensland*: Moggill State Forest, on quartzite rock in *Eucalyptus* forest, 23°34′S, 152°51′E, *R.W. Rogers 2369*, 8.x.1981 (BRI 692220—holotype).

Thallus dull yellow, areolate, saxicolous, surface smooth, lacking isidia, sorediate; soralia conspicuous, scattered, bright yellow, 0.2–0.5 mm diam. Apothecia not seen.
Chemistry: thiophaninic acid (major), norstictic acid (major) and stictic acid (minor).

Etymology: the species is named after the collector, Dr Roderick W. Rogers, Queensland Herbarium.

Remarks
Pertusaria rogersii resembles sterile specimens of *P. xanthoplaca* Müll.Arg. (Müller 1882), and was first reported as that species (Archer 1997), but it is distinguished by containing both thiophaninic and norstictic acids. The species is so far known only from the infertile type specimen.

Only one other saxicolous *Pertusaria* containing thiophaninic acid and norstictic acid is known, namely *P. huneckiana* Feige & Lumbsch, a fertile, non-sorediate species from Minorca with 8-spored asci (Lumbsch *et al.* 1993).

New records for Australia

1. *Pertusaria excludens* Nyl., *Flora* **68**, 296 (1885) Fig. 2
Type: France, Languedoc Roussillon, Pyrénées-Orientales, Amélie, [Amélie les Bains, 42°36′N, 2°37′E, alt. 230 m] super saxa micaceo-schistosa, *W. Nylander* 1884 (H-NYL 23827—lectotype, *fide* Dibben 1980 (not seen).

Thallus off-white, thick, conspicuously cracked, forming numerous areolae, saxicolous; surface smooth, tuberculate, lacking isidia, sorediate. Soralia sparse and ill-defined (in the Australian specimen). Apothecia not seen.
Chemistry: norstictic acid (major) and connorstictic acid (minor).

Remarks
Pertusaria excludens is characterized by the saxicolous habitat, the sorediate thallus, the absence of apothecia and the presence of norstictic acid. The soralia in the Australian specimen are sparse and ill-defined, but Nylander (1885) reported them to be prominent, 0.6–1.2 mm wide, and Dibben (1980) described them as sorediate discs. Øvstedal & Smith (2001) reported the soralia to be initially pycnidia-like, later becoming crateriform with coarse soredia.

Pertusaria excludens resembles *P. miniatescens* A.W.Archer & Elix from Lord Howe Island (Archer & Elix 1994); both are saxicolous, sterile and sorediate, and contain norstictic acid. However, *P. miniatescens* has an olive-green thallus (off-white in *P. excludens*). Also, the soralia of *P. miniatescens* are blastidia-like and with age become corticate in part and pseudoisidiate, but the soralia of *P. excludens* do not. *Pertusaria excludens* has an off-white thallus (olive-green in *P. miniatescens*). *Pertusaria miniatescens* is endemic to subtropical Lord Howe Island, whereas *Pertusaria excludens* has a broad bipolar distribution, including Western Europe, Macaronesia, North America, Asia, Africa, the Falkland Islands and Antarctica.

SPECIMEN EXAMINED
Australian Capital Territory: • Namadgi National Park, summit area of Mount Murray, 35°41′26″S, 148°47′35″E, alt. 1800–1850 m, on exposed granite, *P.M. McCarthy 4176*, 9.xii.2013 (CANB).

2. *Pertusaria nebulosa* A.W.Archer, *in* J.A. Elix, H. Streimann & A.W. Archer, *Proc. Linn. Soc. N.S.W.* **113**, 65 (1992) Fig. 3

Type: Norfolk Island, Duncombe Bay, 29°00′20″S, 167°57′30″E, alt. 100 m, on *Elaeodendron*, in regrowth forest just south of the Captain Cook Memorial, *J.A. Elix 18389*, 3.xii.1984 (CANB—holotype).

Thallus pale olive-green, slightly tuberculate, corticolous, surface smooth and shiny, lacking isidia and soredia. Apothecia verruciform, conspicuous, numerous, rarely confluent, flattened-hemispherical, becoming constricted at the base 0.8–1.5(–2.0) mm diam. Ostioles conspicuous, black, lacking a hyaline margin, 1–4 per verruca. Ascospores 4 per ascus, uniseriate, ellipsoid, smooth, 95–115 μm long, 30–35 μm wide.
Chemistry: no lichen compounds detected.

Remarks
Pertusaria nebulosa is characterized by the smooth olive-green thallus, the numerous conspicuous, verruciform apothecia with conspicuous black ostioles, asci with four uniseriate ascospores and the absence of lichen compounds. It resembles *P. melaleucoides* Müll.Arg. (Müller 1884), a species also found on *Avicennia* and lacking lichen compounds but with bisporous asci. The species was reported from the Buckenbowra River Estuary as *P. atropunctata* A.W.Archer (Archer 1991), a later synonym of *P. melaleucoides*. *Pertusaria nebulosa* was previously known only from Norfolk Island.

SPECIMEN EXAMINED
New South Wales: • Buckenbowra River Estuary, 7.5 km W of Batemans Bay, 34°42′S, 150°06′E, alt. 1 m, on *Avicennia*, *J. Johnston 2811*, 29.xi.1989 (CANB).

3. *Pertusaria oahuensis* H.Magn., *in* A.H. Magnusson & A. Zahlbruckner, *Arkiv för Botanik* **31A**(6), 57 (1944) Fig. 4

Type: United States of America, *Hawaii*, Oahu, Waianae, near Kolekole Pass, on smooth bark, *O. Selling s.n.*, 3.ix.1938 (S—holotype!).

Thallus corticolous, off-white, surface smooth and somewhat rimose, sorediate, lacking isidia. Soralia white, numerous, conspicuous, crowded, adnate, scattered or sometimes confluent, 0.6–1.3 mm diam. Apothecia not seen.
Chemistry: lichexanthone (major), stictic acid (minor) and constictic acid (trace).

Remarks
Pertusaria oahuensis is characterized by the sorediate thallus, the presence of lichexanthone and stictic acid and the absence of apothecia. It resembles *P. albopunctata* A.W.Archer & Elix (Archer & Elix 2009), a similar sterile, sorediate species that contains stictic acid but lacks lichexanthone.

Pertusaria oahuensis was listed only from the Hawaiian Islands (Elix & McCarthy 1998), but an earlier report (Shine *et al.* 1973) tentatively identified a specimen from eastern Queensland as *P. oahuensis*. The chemistry of that specimen was not reported, and possibly the specimen was the more common *P. leucosorodes* Nyl. (syn: *P. scaberula* A.W.Archer), which also occurs in Queensland. *Pertusaria oahuensis* and *P. leucosorodes* are differentiated by their chemistry; the former contains stictic acid and the latter thamnolic acid. *Pertusaria oahuensis* is also found in the Galapagos Islands (F. Bungartz *in litt*.).

SPECIMEN EXAMINED
New South Wales: • Cotton-Bimbang National Park, 83 km E of Walcha, 31°24'S, 152°07'E, alt. 685 m, on *Acacia*, *J.A. Elix 43109*, 6.viii.2008 (CANB).

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Fig. 1. *Pertusaria rogersii* A.W.Archer & Elix, holotype; bar = 1 mm

Fig. 2. *Pertusaria excludens* Nyl. *P.M. McCarthy 4176*; bar = 1 mm

Fig. 3. *Pertusaria nebulosa* A.W.Archer; *J. Johnston 2811;* bar = 1 mm

Fig. 4. *Pertusaria oahuensis* H.Magn. *J.A. Elix 43109*; bar = 1 mm

Peter Wilfrid James (1930–2014), the Godfather of modern Australasian lichenology

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Peter James (Fig. 1) died in Birmingham on 13 February, 2014, after a long illness (Marren 2014). Since he truly was the Godfather of modern lichenology in Australasia, "the perennially good-humoured Godfather" as Jack Elix (1990) so perceptively wrote, it is fitting to remember his considerable influence on the development of lichenology in Australia and New Zealand in the last four decades of the 20th century, and also of his many contributions to modern lichenology viewed from an Australasian perspective.

Peter was born at St Just in Roseland, a picturesque village on the Fal estuary near Falmouth in Cornwall, on 28 April, 1930. His father Wilfrid James was a secondary school Headmaster in Birmingham. He was educated at Bishop Veysey's Grammar School in Sutton Coldfield from 1943–1948, then he attended Liverpool University from 1949–1955, where he graduated B.Sc. with First Class Honours in Botany in 1952. Among his classmates in Chemistry was the singer John Shirley-Quirk (1931–2014) who was an industrial chemist before making a long career as a concert and opera singer and university teacher in voice. At Liverpool, Peter also knew Patricia Routledge, later to become a well-known actress on stage and television. Peter stayed on as a post-graduate student and University Demonstrator in Botany at Liverpool. His interest in lichens was awakened quite by chance when he accompanied a zoologist colleague, who was working on Lake Bala in North Wales, to his research site. Around the lake he noticed a rich growth of lichens, collected them, and took them back to Liverpool for study. His supervisor allowed Peter to work on the lichens of North Wales for a Ph.D., but because he died shortly after, Peter's new supervisor became the Professor who, knowing nothing at all about lichens, suggested that Peter work as a vacation student in the lichen herbarium of the British Museum and get to know something of the literature relating to British lichens and learn how to curate specimens (Galloway 1990). Peter once told me that he had also thought of doing a PhD with the formidable Irene Manton FRS at Leeds, but at the interview, which was difficult, he was able to read upside down across the table that Manton had written "NBG" next to his name. Fortunately for lichenology, it was not to be!

Instead, Peter turned to the British Museum (Natural History) where he was taken on, in 1955 at the age of 25, by Dr (later Sir) George Taylor FRS, FRSE (1904–1993), the Keeper of Botany, and placed in charge of lichens. Peter had previously worked as a vacation student when the lichen herbarium was still in the Central Tower, where diatoms are now housed. The major part of the cryptogamic herbarium, excluding ferns and diatoms, was moved from the Central Tower to its present position in the late 1950s after reconstruction of war damage, with lichens occupying first a central position where bryophytes are now, then finally moving further east to their present position adjacent to the Mineralogy Library in 1969 when the Kew lichens were added on permanent loan. At the same time, the BM mycological collections were transferred to Kew as a condition of the Morton Agreement, the myxomycete collections being retained by both Kew and the BM (Galloway & Laundon 2012). However, on joining the BM staff, Peter was almost immediately called up for National Service, which took him to western Germany for nearly three years, during which time he met several German lichenologists, including Josef Poelt. He rejoined the Museum staff in 1958, the year that the British Lichen Society was formed (Laundon 1995), and became the foundation Editor of its journal *The Lichen-ologist* (Brown *et al*. 1990, Arvidsson 2012). Peter contributed two papers to *The Lichen-ologist*'s first issue, as well as a thoughtful editorial (James 1958a). His "Notes on the collection and preservation of lichens" (James 1958b), addressed to the beginner in lichenology, are still well worth a read today.

As Scientific Officer in charge of lichens, Peter was continuing in an honourable tradition of British lichenology, his predecessors at the BM including the Rev. James Morrison Crombie (1831–1906), Annie Lorrain Smith (1854–1937) and Ivan Mackenzie Lamb (later Elke Mackenzie) (1911–1990). Peter's early influences in British lichenology were the established figures of Walter Watson (1872–1960), Frederick Archibald Sowter (1899–1972), Arthur E. Wade (1895–1989) and Ursula Duncan (1910–1985), all of whom were responsible for keeping lichenology alive in England, Wales and Scotland in what are now termed "the leanest years" or the "dark days" (Hawksworth & Seaward 1977, Gilbert 2004). Peter's sole meeting with a very old and infirm Walter Watson, as he once told me, involved talk of test cricket and not of lichens at all, Watson then having lost his memory for lichens. Ursula Duncan was the strongest influence in developing Peter's interest in lichens. At a field meeting in the Lake District supposedly devoted to bryophytes, Ursula Duncan realized that in Peter James she had an apt and interested pupil, and the weekend was devoted to lichens instead. Over subsequent years she taught him all she knew about British lichens. Peter later wrote of this: "…by unstintingly putting her time, knowledge and collections at the service of young aspiring lichenologists she undoubtedly played a premier role in the renaissance of the subject in Britain. Those of us privileged to attend her courses at Kindrogan Field Centre or come under her guidance at British Lichen Society field meetings have treasured memories of the great enjoyment, humour and value of those occasions…" (James 1986: 384). Peter was to be of considerable help to Ursula Duncan in the production of her book *An Introduction to British Lichens* (Duncan 1970). Indeed, in her Introduction to that book, which was for many years a kind of British lichenology "bible", Ursula Duncan noted "…It is not too much to say that this book could not have been written without the help of Mr. P.W. James, who has supplied much of the scientific data and also given assistance throughout, especially with the keys…" (Duncan 1970: vii).

In November, 1958, Peter joined an expedition to Patagonia organized by the Tasmanian Geoff Bratt (1931–1977), an excellent mountaineer who was then finishing a PhD in Chemistry at Imperial College (Filson 1978). Bratt encouraged the explorer/mountaineer Eric Shipton (1907–1977) to join him (they had climbed together in the Karakorum the year previously when Bratt invited Shipton to lead the Imperial College expedition there), and the Museum seconded Peter James to this venture to collect lichens, mosses, ferns and flowering plants. That introduced Peter to the lush lichen mycobiota of the Lago Argentino region where the expedition was based. Peter's pivotal role in the expedition is warmly recounted by Shipton (1959, 1963, 1969). He made good use of his time there, collecting 4000 specimens, including 2500 lichens, seeing for the first time the great austral diversity in genera such as *Menegazzia*, *Placopsis*, *Pseudocyphellaria* (which he then still called *Sticta*) and *Psoroma*, which in Britain were each represented by only one or a few species.

The following year, the Otago University organic chemist and lichenologist James Murray (1923–1961) wrote to Peter James to introduce himself and his lichen interests (Galloway 2014a):

> "…Dear Mr James, My friend Mr William Martin has just shown me a letter from you in which you ask about the possibility of exchange of lichen specimens. Mr Martin may have mentioned that I have collections covering all groups, and I should certainly be interested in such an exchange. Unfortunately (in a way) I am leaving New Zealand on November 3 and will be away till 1961, but it occurs to me that you may be interested in some particular genus or other group. In that case, and if you can let me know as soon as possible, I may be able to bring some specimens with me. My interest is largely selfish, of course, since there is no reference material here at all, except a few Norwegian and North American specimens. Consequently identifying even the commonest European species may be a very difficult matter if not impossible.

I have papers in the press on Antarctic and Subantarctic lichens and on revisions of the New Zealand Coniocarpineae, Peltigeraceae and Teloschistaceae, and am working on the Stictaceae, Collemataceae, Pannariaceae and Parmeliaceae at present, so I have reasonably well identified material in these families (except Collema which defeats me without type material). In general I know the foliose, squamulose and fruticose New Zealand genera, Lecidea and a few small crustose genera but not the Pyrenulaceae or Graphidaceae (sens. lat.). The Cladoniae of course are well covered by Mr Martin who gets any interesting specimens I find.

I am interested to hear of your South American collections and I would be very glad to see some of this. I have had collections made for me in Chile by members of the Royal Society Darwin Preliminary Expedition last (southern) summer in certain genera.

If you do not need material immediately, there is no need to reply to this letter, as I shall be in London from the end of December and will certainly see you there. I am hoping to find time to examine all the types of New Zealand species available in the U.K. during 1960. Yours sincerely, Dr. J. Murray…" (Murray 1959).

Peter replied at once:

"…Dear Dr Murray, Thank you for your interesting letter which I was very pleased to receive this morning. I shall be very glad to give you any help you may require in London with regard to access to the type-specimens of New Zealand lichens both in Kew and here and hope that your stay will be a highly profitable one.

I shall be able to exchange European material with N.Z. gatherings and like yours my interest is largely selfish as we have so little material from your country or Australia.

I shall be most interested to see your papers on New Zealand lichens, particularly those relating to Pannaria and Parmelia. I should like to see what material you have of Menegazzia, Pannaria and Sticta (Pseudocyphellaria) though there will be many more groups which I will eventually want to see good material.

You will be very welcome to look at my 2500 gatherings of Patagonia lichens mainly from the region of Lago Argentino in the far S.W. corner of the province; I expect that you will find specific affinities with N.Z. species.

I will have the types you require sorted out for you pending your arrival in England. They will be mainly Stirton's namings. Yours sincerely, Peter James…" (James 1959).

Three months after that exchange, Murray (known to his friends and students as Jas) and Peter met in London. James Murray, as a Nuffield Foundation Commonwealth Fellow, was working during a sabbatical year in the Organic Chemistry laboratory of Sir Derek Barton FRS, FRSE (Nobel Laureate in 1969) at Imperial College, virtually next door to the Museum in South Kensington. When Murray realized just how numerous and important the BM's lichen collections were, he began spending more and more time in the Lichen Section working with Peter James on New Zealand and Southern Hemisphere genera that were of interest to him, especially *Menegazzia*, *Psoroma*, *Pseudocyphellaria* and *Sticta*, genera that were well represented in herbaria but poorly understood and still poorly collected in New Zealand. Peter and James Murray became firm friends and began a collaborative world monograph of *Sticta sens. lat*., an ambitious undertaking that led to a large amassing of specimens from London (the BM and K), Geneva and Munich and an impressive preliminary working key as a first step. Two letters to Peter written after Murray's return to Dunedin show something of their by then close personal and professional attachment.

"…This is not a letter with anything particular to say, except to let you know that I am still alive and have not been completely submerged by work since I returned. I came back to a completely rearranged set of classes – the University has changed over to an Honours B.Sc. instead of B.Sc. plus M.Sc., but we have to run both types of courses simultaneously for some years till we dispose of (one way or another) those already embarked on the older degree structure. The timetables have also been completely rearranged and I don't know where I'm supposed to be half the time without consulting the book. As I suspected, I have new lecture courses to give as well, so I have plenty to do. I was certainly nearly submerged by lichens when I came back, and the chaos was quite something to behold. They had decided to use my room for something towards the end of the year, and had cleared it out into a space below one of the lecture rooms – it took me a full week even to resort the collections into groups. According to my book I have roughly examined, sorted, packetted [sic] and labelled more than 1400 lichen specimens since I returned so you will see that I have done nothing with any of the things I was working on in London. I only have time to write to you now because I have reached the end of this schemozzle and am starting on something more serious. I have not even looked at the large Antarctic collections yet; I think they may amount to some 2000 specimens – how about sending me an assistant? ...My stuff hasn't arrived yet, but there was a note yesterday to say that it had been sent. Please give my regards to Laundon and Clive [Clive Jermy, a well-known pteridologist who became Head of the Fern Section at the BM. He died on 25 July, 2014]. The lichen section of the BM will really be coming alive with two attacking the collections. The weather has been terrible since we came back, just like the English summer. I'm trying to get the house painted so I know all about it…" (Murray 1961a).

A month later Murray wrote again to Peter James:

"…This is not a letter, but just a note to go with the film of my British collections, which I expect the photographic department will enlarge for you. I checked the Calicia and Graphidales from Wales and think they are right.

There are a number of specimens missing – perhaps you would be good enough to check to see whether you have them; the numbers are 4782, 4784, 4795, 4810, 4810, 5003, 5018, 5265 and 5266. I have been through the lot twice and am sure they are not here. The only missing ones I want to see are 5003 (Lecidea sect. Miltidea), 5265 (Pannaria cf. austriaca) and 5266 (Parmeliella cf. leucosticta). I think I left duplicates of these with you, and I would be glad to have fragments if there is enough to spare. The Pannaria is very close to a New Zealand one, and in fact I cannot distinguish them from memory. At least two of the Subantarctic specimens I wanted to borrow were not in the loan; perhaps I put them in the wrong place. They were Lecidea sect. Miltidea on twigs, and a duplicate of Ramalina inflata (not Hooker's collections), both from the Auckland Islands. Incidentally I am going on an expedition to the Aucklands next year, to deal particularly with the cryptogams.

One box of specimens was rather badly packed, and presented me with problems of 20–30 loose specimens and the same number – more or less – of empty packets. Fortunately I remembered most of them and managed to rematch the lot.

I shall be writing to you very shortly on the subject of nomenclature of some Stictae, as soon as I put together the MS on Campbell Island lichens. I have received a considerable number of specimens from there in the last few months and the original MS has been about doubled. It should be published near the end of the year. You may remember seeing the original which I had held up while I was in England, and have now withdrawn for revision.

I enclose also some duplicate descriptions which I seem to have taken away with my copies.

I shall be sorting out some Stictae to send you in the next month or two, and in August I am going up to Botany Division to go through their large collections of the group. I am told that some boxes of them have been found in a big clearing up, apparently mostly specimens that Dr Allan could not fit into his key to the group, so they should be interesting.

With best regards, Jas

P.S. I'm not sure what I have paid in the way of subscription for the Lichen Society, and haven't a recent note of the Treasurer. Would you be good enough to pass this to the man concerned? If the subscn is more he can let me know. Thanks, Jas…" (Murray 1961b).

After James Murray's untimely death in June, 1961, arrangements were made by the University of Otago and the Nuffield Foundation to bring Peter James to New Zealand to work in Dunedin and also to participate in a Royal Society of New Zealand field project to the Auckland Islands in early 1963 (Godley 1985). Otago University's Professor of Botany Geoff Baylis wrote to ask Peter if he would consider coming out to Dunedin to curate James Murray's extensive lichen collection. Peter was given leave of absence from the Museum on full pay, and arrived in Dunedin in October, 1962, for a six-month stay. In November, thanks to a kind offer from Geoff Baylis (prompted initially by a chance meeting with George Scott who said he would ask "Prof." if there might be a chance of a summer job for me), I was given the opportunity to work over the 1962–63 vacation as Peter's assistant, which began for me a steep learning curve in lichenology and was also the start of a long and productive friendship. I have documented this "Dunedin phase" of Peter's life elsewhere (Galloway 2014b).

Peter's Auckland Islands trip was extremely profitable in terms of lichens seen and collected, and he brought back many lovely things, including specimens of *Steinera* that were to provide the stimulus for a later treatment of that fascinating genus (Henssen & James 1982), and also *Degelia* [now *Degeliella*] *rosulata* (Jørgensen & Galloway 1992, Jørgensen 2004). Trips to Central Otago (Old Man Range, Mt Brewster, Hunter Valley), Fiordland and Maungatua were squeezed in between long days of curating and labelling. A visit to the Fiordland landslides above Lake Thomson allowed Peter to contribute an important study of the role of lichens on successional surfaces (Mark *et al*. 1964), an unlooked-for bonus of his visit. During his time in Dunedin, Peter also helped prepare James Murray's lichen identification keys for publication (Murray 1962, 1963a, 1963b).

By the end of March, 1963, Peter's work in Dunedin was accomplished. The Murray lichen collection was curated and labelled to form the core of the regionally important lichen herbarium at OTA. His own copious collections were packeted and stored in several large boxes – when the carrier came to take them to the shippers, Peter asked "should I tip the fellow?". The Stage I lab where we had worked for the summer was restored to its normal appearance as a teaching space, and for obligatory lectures and talks given to staff and research students, and to the Federation of University Women (on modern music in England). I began my M.Sc. study on lichen lipids, and Peter helped both with providing descriptions for the material that I studied and in convincing a sceptical Prof. Norman Edson that a biochemical approach to lichens really was a worthwhile undertaking. It was a memorable and highly productive six-month visit. Peter thus "started off" in Australasian lichens both Geoff Bratt in Hobart and me in Dunedin, and he kept in touch with us over the next 10 years, maintaining for both of us a link with modern lichenology that was beginning to flourish in the Northern Hemisphere.

I first wrote to Geoff Bratt at the end of October, 1967, at the suggestion of the late Prof. David G. Catcheside FRS (1907–1994), the first President of the British Lichen Society. Catcheside was a very well-known geneticist, then resident in Canberra (where he was the first Director of the Research School of Biological Sciences), who had a strong amateur interest in lichenology and bryology. At that time, apart from William Martin in Dunedin who was then quite active but venerable, there were no other interested "young" lichenologists anywhere in Australasia, and I thought that Catcheside might be interested in an exchange of views and specimens. He suggested that I write to Geoff Bratt in Hobart, a metallurgical chemist who was a keen collector and, according to Catcheside, "the most knowledgeable lichenologist in Australia".

In writing to Geoff I suggested that we should start an exchange of specimens, and I told him of my interests in alpine lichens and the possible relationships of these with Tasmania, western South America and the Subantarctic Islands. I told him that my interest in lichens was an amateur one, but that I was working on aspects of their lipid and carbohydrate metabolism. Geoff responded promptly, describing himself as "… only an amateur part time (pseudo) lichenologist…" But he was keen to exchange specimens and he encouraged me to be a bit more upfront about the few lichenologists that I had then met, foremost among them being Peter James. This drew from Geoff the following comments "…Your first letter interested and amused me. Most lichenologists seem to be dry letter writers and yours was quite a change. Seems that Peter James can be blamed for getting lots of people into bad habits. My interest in lichenology stemmed from picking them up for him while in the Southern Argentine with him some years back. Interested to hear that you are a climber. I am, or was, but haven't done anything serious for years. One day I'll get to N.Z…" (Bratt 1968). Geoff and I corresponded regularly from then on until illness forced him into silence in June, 1977, a few months before he died on 16 October, 1977 (Filson 1978). The catalyst for our friendship by correspondence was Peter James, and through his separate encouragement of our collecting efforts, we managed to forge a congenial and productive interchange which stopped us both feeling that we were looking at lichens *in vacuo*.

In 1972, once arrangements were made for my transference from Applied Biochemistry Division DSIR in Palmerston North to Botany Division DSIR at Lincoln, Eric Godley wisely suggested I aim to work for at least two years at the BM under Peter James's guidance. Peter wrote several warmly encouraging letters, both official (offering the BM's support for my visit) and personal, recommending suitable accommodation and things to bring; he was amazingly helpful.

Not long before I left for London, I arranged to meet Geoff Bratt, who was making a holiday visit to New Zealand, and in November, 1972, we had several good days in the field at Arthur's Pass, almost 10 years to the day since I'd been there with Peter James. Peter wrote to me about that "…Glad you are meeting Geoff Bratt – to my mind he is the only other young serious lichenologist in the Southern Hemisphere besides yourself. Unfortunately he & I seem at loggerheads at the moment which I regret very much. He is a very good climber and you should find many interesting things for he knows the Tasmanian flora well. I am very busy here – The Lichenologist has run into last minute troubles over final printing. Hardly any time to follow up the cultural pursuits of the London scene. Yours amicably…" (James 1972). I have long known just how important for the eventual establishment of lichenology in Tasmania and New Zealand this long-distance contact with Peter actually was. A similar situation existed also with Mack Lamb (1911–1990) from the Farlow Herbarium in Harvard, who actively encouraged Geoff and me to collect alpine species of *Stereocaulon*, something we were eventually able to publish on jointly (Galloway *et al*. 1976). Analogously, Peter was a great encourager and mentor to both Jack Elix (Elix 1990) and Gintaras Kantvilas (Kantvilas 1990) especially, but also to Rex Filson, Nell Stevens and Nathan Sammy. Without Peter's help and encouragement, it is arguable whether Australasian lichenology would have established as successfully as it did in the 1970s and subsequently.

In January, 1973, I began work at the BM. Peter showed me to a spacious bay with a dissecting binocular and compound microscope which was to be my home for the next eight years. Then followed a tour of the lichen herbarium and of the Museum's extensive library facilities. Since my New Zealand specimens had not yet arrived, Peter set me to work to identify British lichens using Ursula Duncan's book (Duncan 1970), as a way of teaching me how to use both keys and descriptions. Later on he suggested that I accompany him to Wiltshire for a recce of the lichens of Stonehenge. We stayed with a BLS stalwart, Alice Burnet, who lived at Ford near Salisbury, and she drove us through February fogs to Stonehenge (I carried the ladder, while Peter

determined, and Alice recorded, the lichen cover), the Avebury Stone Circle and the Kennett Long Barrow. We also visited the New Forest in what was to be the first of many rewarding BLS and private trips into the field with Peter as a patient and knowledgeable guide and mentor.

Peter at that time was the first President of the International Association for Lichenology (Arvidsson 2012), and was heavily involved in helping to organize the first IAL field meeting to the Alps in September, 1973, led by Josef Poelt and Maximilian Steiner (Fig. 2). One sunny afternoon when a significant number of attendees were crammed into a gondola taking us up onto a height above the Gschnitztal, the funicular suddenly stopped and we swayed about for an alarming five minutes or so, high above the ground. Rolf Santesson observed ruefully "…If this gets any worse and something happens to us, then all that lichenology has left is Dodge!".

1974 was memorable for the Progress and Problems meeting at Bristol, which attracted a very wide international attendance of leading lichenologists. At that meeting, Peter James delivered a ground-breaking paper with Aino Henssen on the morphological and taxonomic significance of cephalodia (James & Henssen 1976), which drew from Rolf Santesson in the discussion afterwards "…this is the single most important paper that I have heard in the last 20 years". In that paper, Peter discussed and illustrated the extraordinary *Dendriscocaulon* phase of *Sticta filix* in a series varying from wholly cyanobacterial to the green-algal phase that we recognize as *Sticta filix*, drawing on collections that he made in 1962 from a waterfall near Lake Hankinson in Fiordland. It wowed the Bristol audience at the time, and 24 years later, William Purvis used Peter's sketch of the phenomenon in his popular book on lichens (Purvis 2000: 13). It reminded me of the December day in 1962 when Peter laid out on the bench to dry an intriguing series of specimens, the first time that I had seen large specimens of "Dendriscocaulon".

The Lichen Section at the BM under Peter's sympathetic and friendly direction received a more or less continuous stream of visitors from all corners of the globe as well as locally and from the rest of Britain. Mason Hale was a "regular" in the early 1970s, bringing us news and gossip from the wider world of lichenology, as well as instructing us in Chicita Culberson's methods in thin-layer chromatography. Cliff Smith came every summer from Hawaii, and Dougal Swinscow and Hildur Krog "took over" parts of the Lichen Section with loud discussions of their East Africa lichens, an endeavour that gave rise to an impressive stream of papers and eventually their book, which Peter arranged for the Museum to publish (Swinscow & Krog 1988). Per Magnus was another regular (Fig. 3), dubbed by Peter the "White Volcano" (Jørgensen 2013), and from 1973 onwards, Per Magnus and I collaborated on Australasian Pannariaceae, receiving much help from Peter in the process. Peter also warmly encouraged his helpful and highly disciplined assistant Joy Walker (later Joy White) in her researches on the Neuropogonoid species of *Usnea* (Walker 1985), a study that brought together a wide range of Australasian, Antarctic and South American material.

In January, 1981, Peter was elected an Honorary Member of the British Lichen Society, and in August–September of that year he made his second visit to New Zealand to attend the field trip that I organized for the IAL and which was based at the Canterbury University Field Station at Cass (Fig. 4) and the Rangiora High School's Boyle Lodge (Fig. 5). Peter was very much in his element on that trip, enjoying the relaxed social atmosphere in the company of many of his friends from around the world (Jørgensen 1982) and delighting in the lichens collected, many of which were first records made by him. The day trip to the Nina Valley (Fig. 6) was especially memorable, Per Magnus loudly declaring it to be "*Psoroma* Paradise", but Peter refused to use the walkwire across the Lewis River, preferring instead to wade across (Fig. 7), the walkwire no doubt bringing back frightening memories of the 1962 trip to Lake Hankinson of 19 years earlier (Galloway 2014b).

After the New Zealand trip, Peter began a close examination of *Menegazzia*, reviving

his interest in the genus that he had first absorbed from James Murray 20 years earlier. The result was his magisterial account (James 1985) in *Flora of New Zealand Lichens*, a work with which he was very closely associated. For Peter's help during the 10 years of flora-writing I can do no other than quote from my acknowledgement to him:

> "…Since 1973 he has taken a vital interest in the progress of the present flora and at the start determined how the problems should best be approached. His considerable knowledge of Southern Hemisphere lichens has continuously and unstintingly been placed at my disposal, he patiently undertook many of the chemical analyses recorded herein, and he also prepared the account of *Menegazzia*. In most other genera he offered advice, criticism and encouragement. Finally he helped to read, check and edit the entire manuscript through its many drafts, so that the final work contains considerably fewer errors of fact and judgement than it otherwise would have. Such a contribution should not go unmarked, for without his help this flora which is, in its way, a testament to his interest in the lichens of New Zealand (fostered through his earlier association with James Murray), would never have been attempted or written…" (Galloway 1985: xvi).

In 1982 I was appointed to a Senior Research Fellowship at the BM (if I am to be honest the idea of the Fellowship was largely Peter's with support from John Cannon the Keeper) to research the Museum's large collections of Southern Hemisphere lichens, many of which were from Peter's earlier visits to Argentina, Australia, Tasmania, New Zealand and the Auckland Islands. It was a period when Peter and I worked closely on *Pseudocyphellaria* and other groups, and every so often we had welcome visits from Australian lichenologists for longer or shorter periods, including Rex Filson (who was Australia's Botanical Liason Officer at Kew for a year), Nathan Sammy, Jack Elix, Nell Stevens and Gintaras Kantvilas (Fig. 8), who Peter took under his wing as a long-distance PhD supervisor.

The great gap in our Southern Hemisphere collections at the BM were modern specimens from Chile, and to remedy that defect I organized a two-month trip to Chile with Brian Coppins and Peter. Our Chilean contacts were Gerardo Guzmán from Universidad de Playa Ancha in Valparaíso, and Wanda Quilhot from Universidad de Valparaíso, and we looked at and collected lichens from Fray Jorge National Part in the north to Chiloé in the south. For Peter it was a great escape from the pressures of management issues and other demands on his time at the Museum, and it allowed him to enjoy a Southern Hemisphere "Summer Christmas" in a completely different culture. He was continuously delighted with the plants, the landscape, the people and the lichens (Fig. 9), and we made large collections, at times involving us in considerable logistical difficulties in getting them dry and in a suitable state for posting back to London. It was a trip full of many memorable experiences that we all treasured. A year later Peter and I joined the IAL trip to Baja California organized by Tom Nash, and again Peter delighted in being in a predominantly desert landscape and seeing new lichens in the company of friends and colleagues (Fig. 10).

In 1990, Peter turned 60 and faced the question of retirement (Fig. 11), then a mandatory requirement of the British Civil Service. As a Senior Principal Scientific Officer and Deputy Keeper of the Department of Botany, Peter's official life was increasingly taken up with meetings, writing reports and much managerial work that took him further away from lichens, a process that he strenuously resisted. Although he had a room off the Crypt Library, for most of his working life at the BM Peter worked downstairs in the Lichen Section where he was very much part of its "beating heart" and close to both staff members and especially to visitors, to whom he was always such a courteous and welcoming host.

Retirement for Peter in a logistical sense involved only the vacating of his room, a task that he abdicated to me and Joy White to accomplish. Since Peter had the dubious honour of being introduced at the 25th Anniversary dinner of the BLS as "…the only person who owns a desk on which you can lose an umbrella…opened!" (Moxham 1983), clearing his room was quite a challenge. Eventually places were found for

everything, being saved, relocated or dumped as Peter saw fit when asked for an opinion. When we discovered a large file of letters and papers relating to Peter's time in New Zealand in 1962, he generously said to me "…you had better keep this". Retirement from the Museum certainly did not mean retirement from lichenology because by then Peter was, along with William Purvis, one of the major movers, shakers and contributors to the British Lichen Flora Project, to which he devoted much time, expertise, effort and direction. His manifold contributions to *The Lichen Flora of Great Britain and Ireland* (Purvis *et al*. 1992) were tremendous. He was involved in every stage of that important collaborative venture, from early discussions on funding with Bill Syratt at BP, preparing accounts of various genera, assisting most of the other contributing authors in a myriad of ways, and then shouldering editorial and proofreading tasks before assisting with publication through Natural History Museum Publications. Retirement also released him for further work on *Nephroma* with Joy White, which they had begun so successfully a few years earlier (James & White 1987, White & James 1988), and which he spoke about at the IAL meeting on Tropical Lichens in London in September, 1989 (Fig. 12).

At that time, too, he was persuaded to make a major contribution to the first volume of the *Flora of Australia* with his account of *Menegazzia* (James & Galloway 1992). That was achieved by the expedient of sitting Peter down in front of a wide range of material and getting him to generate descriptions verbally, which I copied down and then typed up for his appraisal. The system worked remarkably well. The only trouble was restraining Peter from endlessly qualifying every character with copious nuances of variation. It was all there in his head, ready-formed it seemed from his earlier field collections and studies and discussions with Jas Murray 30 years before. He was much the same with many other groups, including *Usnea*, the Lobariaceae and the Pannariaceae. Peter was at the launch of the first lichen volume for the *Flora of Australia* that took place after breakfast on the morning of 4 September, 1992, at the IAL meeting in Båstad, Sweden (Figs 13, 14), and was later honoured by the Association and the meeting as one of the foundation Acharius Medalists (Coppins 1993).

In 1993 and 1994 Peter worked closely with Per Magnus Jørgensen and Charlie Jarvis on typification of all 110 of Linnaeus's lichen names (in *Lichen*, *Mucor* and *Tremella*) as part of Charlie's wide-ranging Linnaean Plant Name Typification Project (Jarvis & Turland 1997; Jarvis 2007a, 2007b). Publication of the Linnaean lichen paper was a milestone work of which Peter was justifiably proud (Jørgensen *et al*. 1994), and the day that reprints of it reached the Museum, Peter gave me an autographed reprint just before I left the Museum and London to return to New Zealand. We could look back on many shared happy times at the Museum, on field meetings and conferences, at the theatre, at concerts (at the Royal Festival Hall or the Royal Albert Hall), at dress rehearsals and first nights at the opera (The Royal Opera Covent Garden, English National Opera, Opera North and Welsh National Opera) with tickets from Patricia, and at innumerable meals at our houses (Winchmore Hill and Chingford) and his flat (19 Edith Road, Baron's Court).

Peter's Edith Road flat was well-known to many lichenologists. It occupied the top floor of a semi-detached Victorian villa, owned by Peter's eccentric but highly regarded mineralogist colleague from the Museum, Peter Embrey (1929–2010), who had a note pinned above his Museum desk "A woman's place is in the wrong!" Embry had hoped (since 1958!) to renovate the house from the basement upwards, an ongoing and painfully slow process which meant that whenever you visited Peter James, you had to run the obstacle race of piles of wood propped against the entrance hall walls and potentially lethal gaps in the stairs. However, in Peter's domain at the top of the house a warm welcome was always guaranteed, even when he was ill (which he very rarely was). Art work crammed the walls of his small dining and sitting rooms. Memorable were several paintings by Claire Dalby, especially of blue Himalayan poppies and of *Pulsatilla vulgaris*. Peter owned a wide collection of books and a huge record collection. Always keen on good sound quality, he had the best turntable, and

early on installed a Quad amplifier and preamplifier, playing the output though a superb Leak speaker which we inherited once he decided to upgrade his Hi Fi system in 1974. Pride of place was a complete collection of Bach cantatas by Nikolaus Hanoncourt and his singers and band for Telefunken [Das Alte Werk] Records. Peter had a fine appreciation of the human voice and an eclectic musical sympathy, liking especially Berlioz, Mozart and Rameau. Bach, however, was his favourite, and in July, 1967, he wrote to me "…I am glad you are keeping up with your 'cello work. I am going to Covent Garden tonight to see Geraint Evans and Tito Gobbi in Don Giovanni. My record collection grows apace; I am making a special study of Bach Cantatas in my spare time (what little I have) eventually with a view to publication…" (James 1967). His love of Bach never faltered, and although the projected book never eventuated, he knew every cantata (there are 193 of them — the Teldec recording series was completed in 1990 and reissued in 1994), and it was fitting that two of the most sublime arias from the cantatas (sung by Janet Baker, and by John Shirley Quirk) were played at his funeral at the Sutton Coldfield Crematorium on 10 March earlier this year.

Peter was an exemplary and attentive host, both at the Museum and entertaining friends or Lichen Section visitors to lunch in one of his several favourite restaurants at South Kensington such as Daquise or Barino, or a well-prepared dinner at his flat. He was a good cook (he swore by Katie Stewart's recipes), but had the most basic of kitchens and he never got round to putting up cupboards, preferring to have everything either on the single table or on the floor! That haphazard arrangement had no effect whatever on the excellence of what was consistently produced from that small, cluttered space. Vivid pen portraits of Peter James are found in Swinscow (1989: 227–228) and Gilbert (2004: 13–15).

Having known Peter well for so long and having shared many lichenological and non-lichenological times with him, I can say in all honesty that his direct influence on the development of Australasian lichenology during the last four decades of the 20th century was profound, and I am sure that Jack Elix, Rex Filson, Gintaras Kantvilas, Nell Stevens and the late Nathan Sammy would all warmly agree with that. The establishment of good herbarium collections, and associated research papers extending from New Zealand, to Tasmania, Australia, New Guinea and South America was Peter's major contribution to Southern Hemisphere lichenology, a contribution borne out of his ever ready willingness to help and one which flourished alongside his major and long-standing work on the lichens of Great Britain and Ireland.

The published lichen *Floras* of both New Zealand (Galloway 1985) and Australia (Grgurinovic 1992) are the visible record of a distinctive Jamesian legacy that allowed modern Australasian lichenology to take root, grow and flourish — they are an indissoluble part of his memorial.

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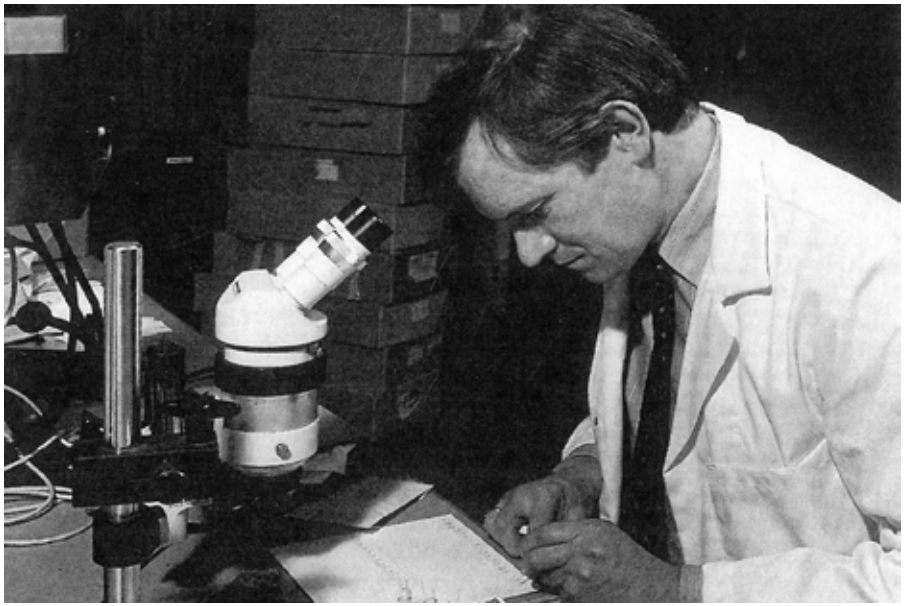

Fig. 1. Peter James in the Lichen Section BM, *c.* 1985.

Fig. 2. Rolf, Santesson (left), Peter James and Josef Poelt (right), first IAL field meeting in the Alps, 1973.

Fig. 3. Lichen Section BM, 1992, Per Magnus Jørgensen (left), Pat Wolseley, William Purvis, Edit Farkas, Laci Lőkös, Begoña Aguirre-Hudson, Peter James.

Fig. 4. Peter James (left) at Cass with Joy Walker, Joy Fildes, Bill Buck, Per Magnus Jørgensen and Harrie Sipman, 1981.

Fig. 5. IAL field meeting at Boyle Lodge, 1981. Peter James 2nd from left in front row.

Fig. 6. Peter James and Per Magnus Jørgensen with *Degelia durietzii* in the Nina Valley, 1981.

Fig. 7. Peter James and David Galloway fording the Lewis River, 1981.

Fig. 8. David Galloway, Gintaras Kantvilas and Peter James at Chingford, London.

Fig. 9. Peter James and Gerardo Guzmán above Cucao, Chiloé, 1986.

Fig. 10. IAL field meeting Baja California, 1987. Peter James third from right in back row.

Fig. 11. Botany Department, Peter James fifth from left in front row, 1990.

Fig. 12. IAL Tropical Lichens Meeting, Linnean Society Library, September, 1989. Patricia Galloway, Peter James, David Galloway and Cliff Smith.

Fig. 13. Launch of *Flora of Australia*, Vol. 54, Båstad, Sweden, 4 September, 1992. Josef Hafellner (left), Cheryl Grgurinovic, Jack Elix, Rex Filson, Aino Henssen, Peter James, Lars Arvidsson and David Galloway.

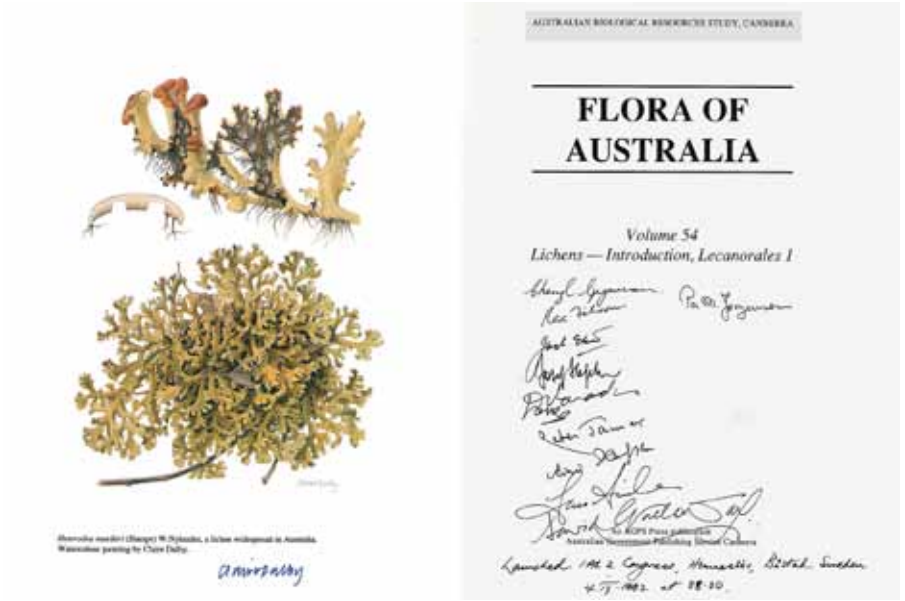

Fig. 14. Title page of *Flora of Australia* Vol. **54**, signed at launch.

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