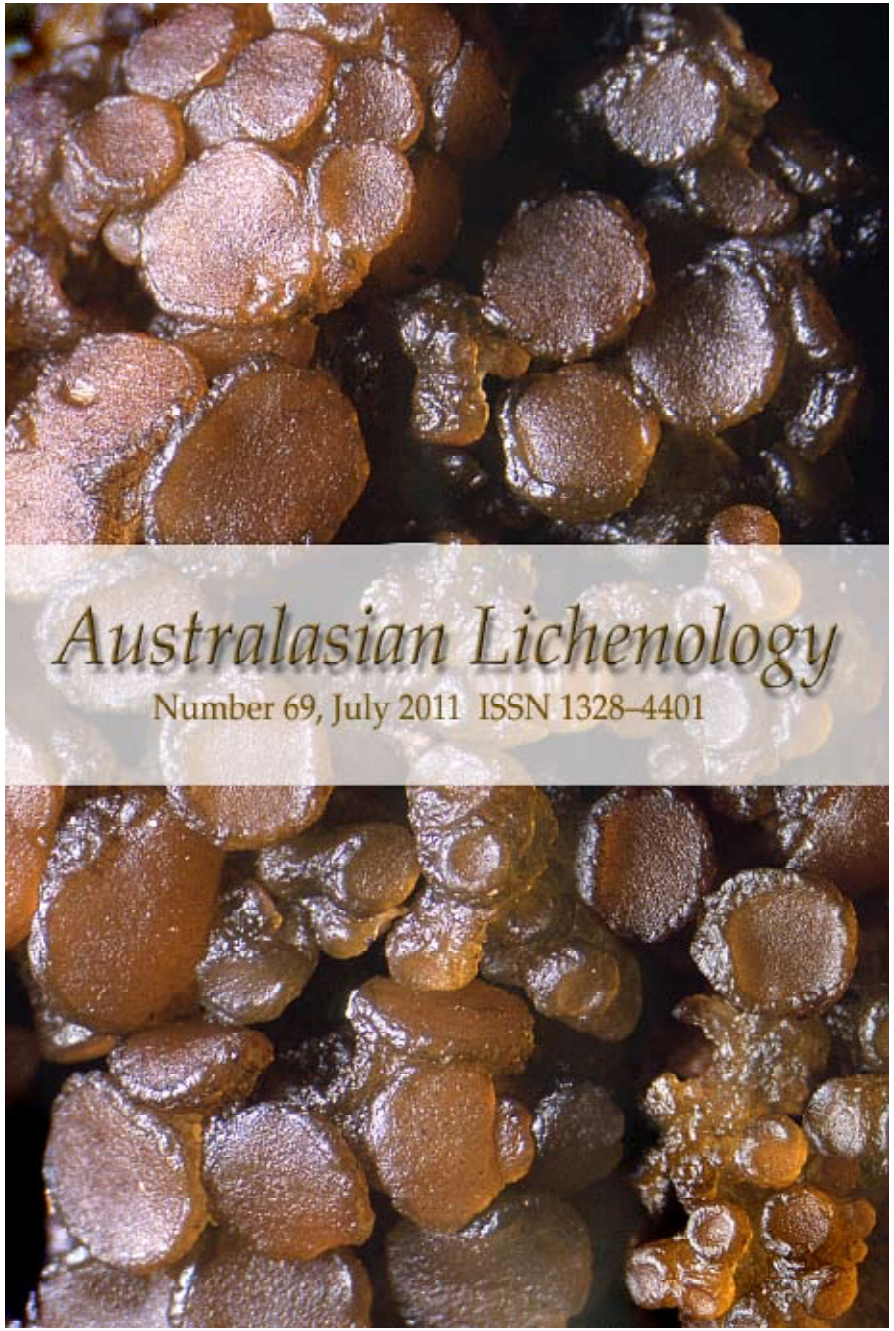

Australasian Lichenology

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The cosmopolitan *Collema fasciculare* is common in New Zealand and Australia in shady mixed rainforest and *Nothofagus* forest from sealevel to subalpine elevations. In colour, it varies from a light or olive-brown when hydrated to nearly black when dry. 1 mm

CONTENTS

ANNOUNCEMENTS

Lichen website of the Australian National Botanic Gardens

The lichen website of the Australian National Botanic Gardens is now open and can be reached at http://www.anbg.gov.au/lichen/ The excellent and well-illustrated text was written by Heino Lepp.

26th John Child Bryophyte and Lichen Workshop—1–6 December, 2011

The 26th John Child Bryophyte and Lichen Workshop will be held in Matawai, New Zealand, 70 km north of Gisborne on the East Cape of the North Island. Attendees should arrive on the evening of 1 December, and depart on the morning of 6 December.

The John Child workshops aim to foster interest in mosses, liverworts, hornworts, and lichens, and are open to anybody from beginners to professionals. The regular attendees are very friendly—they welcome newcomers, and freely offer guidance to beginners.

Group accommodation will be mostly in backpacker accommodation in Matawai or in nearby cottages or shearers' quarters. Breakfast and lunch-making will be in Matawai Hall, as will the microscope work and evening talks.

Each of the four workshop days will consist of a morning-to-mid-afternoon field trip, a return to Matawai for afternoon microscope work, then a catered dinner in the evening followed by illustrated talks and further microscope work.

The best student presentation will receive a cash prize that covers most of the cost of the workshop.

Overall workshop costs are estimated to be at most NZD380 per person, which includes field trip transport, accommodation, and all meals.

To register or obtain further information, e-mail one of the workshop's organizers:

Anne Redpath
e-mail: wairataforestfarm@farmside.co.nz

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New records of *Ramalina* (Ramalinaceae, Ascomycota) from the Cook Islands, South Pacific Ocean

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Abstract:
Ramalina australiensis Nyl., *R. microspora* Kremp. and *R. peruviana* Ach. are reported for the first time from the Cook Islands, South Pacific Ocean.

Introduction

Until relatively recently, the lichens of the Cook Islands were not well-known, the only significant attempt at documenting species being that of Sbarbaro (1939). Elix & McCarthy (1998) summarized current knowledge of the lichens from a number of Pacific Islands, including the Cook Islands, although they warned that not all the species identifications were reliable. Subsequently, reviews of the Parmeliaceae (Louwhoff & Elix 2000) and pyrenocarpous taxa (McCarthy 2000) were published. Sbarbaro (1939) reported six species of *Ramalina* (*R. canaliculata* (Fr.) Taylor, *R. complanata* Nyl., *R. gracilenta* Ach., *R. subcomplanata* Nyl., *R. subfraxinea* Nyl. and *R. taitensis* Nyl.). Elix & McCarthy (1998) listed seven (*R. canaliculata*, *R. leiodea* (Nyl.) Nyl., *R. luciae* Molho, Brodo, W.L.Culb. & C.F.Culb, *R. pacifica* var. *pacifica* Asah., *R. subcomplanata*, *R. subfraxinea* and *R. tayloriana* Zahlbr.). The records of *R. leiodea*, *R. luciae* and *R. pacifica* had already been documented by Stevens (1982, 1983a), who also cited voucher specimens. Stevens (1983b) referred specimens of *R. canaliculata* with boninic acid to *R. leiodea*, and she noted that the name *R. canaliculata* (Fr.) Taylor is illegitimate, and neither it nor the correct name *R. tayloriana* is applicable to Pacific material. Therefore, it seems likely to us that the names *R. canaliculata* and *R. tayloriana* for the Cook Islands both refer to *R. leiodea*, although we have not seen the relevant specimens.

This paper confirms five species of *Ramalina* from Rarotonga and one from Mangaia; three species are added to the lichen flora of the Cook Islands.

Materials and methods

Twelve specimens were collected during two trips to Rarotonga (13–18 April, 2003, and 7–25 July, 2010) and one to Mangaia (13–18 April, 2003) (Fig. 1). Chemical constituents were identified using standardized techniques of thin-layer chromatography (Culberson 1972, White & James 1985). Voucher specimens were deposited in the herbarium of Unitec Institute of Technology, Auckland, and Auckland War Memorial Museum herbarium (AK). Descriptions are based on Rarotongan material.

New reports

1. **Ramalina australiensis** Nyl., *Bull. Soc. Linn. Normandie*, sér. 2, **4**, 120 (1870) Fig. 2
Type: Western Australia, "prope Swan River", 1846, *Verreaux s.n.* (H-NYL 37491 – holotype, PC – isotype, not seen)

Thallus saxicolous, yellow-green, erect to subpendulous, 4–11 cm long; branching sparse in basal region, dense and irregular towards the apices where small branchlets proliferate; branch width 0.1–1.3 mm, primary branches subterete to slightly flattened, secondary branches fine and terete, apices curled or hooked; surface matt, longitudinally grooved near the base; linear pseudocyphellae present; holdfast delimited; soralia absent. Apothecia not seen.
Chemistry: usnic acid in the cortex; no substances in the medulla.

Remarks
Ramalina australiensis is distinguished by the subterete to terete primary branches with dense secondary branching towards the apices, linear pseudocyphellae, and no medullary acids. The species is morphologically similar to *R. peruviana*, but lacks soralia and does not have sekikaic acid aggregate metabolites. Sparsely branched forms resemble the Australian species *R. filicaulis*, but the latter does not usually have the proliferation of secondary branches near the apices. Saxicolous specimens of *R. australiensis* can approach the morphology of *R. meridionalis*, but that species lacks secondary branches and its medulla contains norstictic acid (K+ red).

Ramalina australiensis is known also from Australia (Stevens 1987, McCarthy 2011), New Zealand (Blanchon *et al.* 1996a, Galloway 2007), the Kermadec Islands (Bannister & Blanchon 2003), Guam, the Hawaiian Islands and the Galapagos Islands (Elix & McCarthy 1998). On Rarotonga, it seems to be genuinely scarce—it was seen only once during a 10-day survey of the mountain ranges and valley systems.

SPECIMEN EXAMINED
Cook Islands: *Rarotonga*: • Maungatea Bluff, 21°13'17.59"S, 159°46'51.78"W, 246 m, uncommon. On exposed basalt rock outcrops within dense Tuanu'e (*Dicranopteris linearis*) fernland, *P.J. de Lange CK73 & T.J. Martin*, 7.vii.2010 (AK 323275).

2. **Ramalina microspora** Kremp., *Verhandl. Zool.-bot. Ges. Wien* **26**, 435 (1876). Fig. 3
Type: Hawaiian Islands, Pali, auf felsen. *H. Wawra 1738*, 1868–1871 (W-holotype, not seen).

Thallus saxicolous, orange-brown (possibly dead), caespitose, to 1 cm high. Branching dense, with many small lateral branches, anastomoses visible among the branches; branches narrow, subterete to flattened at the base, 0.2–1.4 mm wide, surface pitted and uneven; no pseudocyphellae seen; holdfast delimited and blackened. Apothecia common, subterminal, marginal, laminal and some geniculate, disc concave to plane when very young with a thick thalline margin, plane to convex, with a thin margin when mature, 1–4 mm in diameter. Ascospores 8 per ascus, elliptical, 1-septate, 9–14 μm long, 3–4 μm wide.
Chemistry: cortex: usnic acid; medulla: divaricatic acid.

Remarks
The saxicolous *Ramalina microspora* is characterized by its densely branched caespitose thallus studded with subterminal and marginal apothecia, and a divaricatic acid chemistry. It has possible affinities with the evernic acid-containing *R. litorea* from Australia, Mauritius and Rodrigues Island (Stevens 1987). It was formerly known only from the Hawaiian Islands, where it grows on coastal cliffs (Smith 1991), and it is also present on the Kermadec Islands (Blanchon *et al.* 2012, in press). This specimen might have been dead at the time of collection, and was more robust than Hawaiian material. *Ramalina microspora* is probably uncommon on Rarotonga—it has not been recorded by past collectors, yet it grows in a coastal habitat that is easily reached by anyone.

SPECIMEN EXAMINED
Cook Islands: *Rarotonga*: • Muri Lagoon, Motu Oneroa, 21°14'S, 159°44'W, 1 m, on coral lying at the margin of beach and forest on a Motu. Uncommon, *P.J. de Lange CK74*, 23.vii.2010 (AK 323276).

3. **Ramalina peruviana** Ach., *Lichenogr. Universalis* 599 (1810) Fig. 4
Type: Peru, *Lagasta s.n.* (H-ACH – holotype; BM-ACH, UPS-ACH – isotypes, not seen).

Thallus corticolous, grey-green, tufted, up to 5 cm long; branching subdichotomous, intricate; branches 0.2–1.1 mm wide, subterete, slightly twisted and tangled, apices sharp; surface shiny, smooth, pseudocyphellae present; holdfast delimited; soralia punctiform, numerous, laminal, marginal and apical, small fibrils occasionally forming in soralia. Apothecia not seen.
Chemistry: cortex: usnic acid; medulla: homosekikaic acid (major), sekikaic acid (major), and minor traces of two other acids.

Remarks
Ramalina peruviana is characterized by its thallus with dense subterete branches, numerous punctiform soralia, and the presence of the sekikaic acid aggregate in the medulla (including homosekikaic acid as a major component). Morphologically, it could be mistaken for several other species; however, *R. australiensis* lacks medullary acids and soralia, both *R. luciae* and *R. pacifica* have dichotomous branching and round or ellipsoidal soralia, with *R. luciae* further lacking homosekikaic acid in any significant quantity, and *R. pacifica* possessing salazinic acid instead of the sekikaic acid aggregate. *Ramalina peruviana* is also found in New Zealand, the Kermadec Islands, Norfolk Island, Lord Howe Island, and the Chatham Islands (Bannister & Blanchon 2003, Galloway 2007), Africa, Australia and South America (Stevens 1987), and Hawaii, Tahiti, New Caledonia, the Galapagos Islands and the Bonin Islands (Elix & McCarthy 1998). On Rarotonga it was frequently observed during a 10-day survey of the central mountain ranges and valleys, where it commonly grew with *R. leiodea* and *R. luciae* on the canopy branches of wind-shorn trees on steep ridgelines and valley heads.

SPECIMEN EXAMINED
Cook Islands: *Rarotonga*: • Maungatea, Upper Vaikapuangi Stream, 21°13′25.86″S, 159°46′56.48″W, 323 m, common. Growing on the canopy branches of pua (*Fagraea berteroana*), *P.J. de Lange CK72 & T.J. Martin*, 7.vii.2010 (AK 323274).

Other species collected

Ramalina luciae Molho, Brodo, W.L.Culb. & C.F.Culb., *Bryologist* **84**, 396 (1981)

Previously reported from Rarotonga by Stevens (1982, 1983a), *Ramalina luciae* is characterized by its dichotomously branched thallus with widely spaced branches, soralia both laminal and marginal, round or ellipsoidal, and the presence of the sekikaic acid aggregate in the medulla.

One of the most abundant *Ramalina* species on Rarotonga, it is common from the coast to the summit of the main range, Te Manga (663 m a.s.l.). Along with *R. leiodea* it is common in village gardens and associated wasteland, and is especially prominent on the trunk and branches of *Polyscias scutellaria*, a shrub used widely by islanders for hedging to mark garden plots and land boundaries. Other common garden plant hosts include *Hibiscus schizopetalus* and *H. rosa-sinensis*. In wasteland and along the coastline it is frequently found with *R. leiodea* on the trunks of coconut (*Cocos nucifera*) palms. It is also known from Australia, Sri Lanka, Indonesia (Sulawesi), Kenya, Vanuatu, Fiji, Tahiti (Stevens 1983a, 1987), the Kermadec Islands (Blanchon *et al*. 1996a), and Niue (Blanchon *et al*. 1996b).

SPECIMENS EXAMINED
Cook Islands: *Rarotonga*: • Titikaveka, Nana's House, 21°16′S, 159°46′W, c. 2 m, common on the bark of *Polyscias scutellaria* used for hedging, *F.J.T. de Lange*, 28.vii.2008 (AK 318416); • Maungatea Bluffs, "The Pinnacle", 21°13′23″S, 159°46′49.5″W, 362 m, common on dead, exposed branchlets of mato (*Homalium acuminatum*) on steep rubbly slope leading to a small pinnacle of rock overlooking the eastern-most tributary to the Vaikapuangi Stream, *P.J. de Lange CK50 & T.J. Martin*, 6.vii.2010 (AK 317738); • Maungatea Bluff, Maungatea Ridgeline, 21°13′20.5″S, 159°46′49.68″W, 355 m, on *Homalium acuminatum* twigs in full sunlight, *P.J. de Lange & T.J. Martin CK71*, 7.vii.2010 (AK 323273)**.** *Mangaia*: • Mangaia Lodge, 21°55′21.53″S, 157°57′16.9″W, 47 m, *M. Galbraith*, 14.iv.2003 (Unitec 004099); • Oneroa School, 21°55′23.64″S, 157°57′15.55″W, 15 m, *M. Galbraith*, 16.iv.2003 (Unitec 004098).

Ramalina leiodea (Nyl.) Nyl., *Lich. Nov. Zel.* 22 (1888)

Previously recorded for Rarotonga by Stevens (1982, 1983a), *Ramalina leiodea* is distinguished by the subdichotomous branching, common apothecia, the lack of soralia and the presence of boninic acid in the medulla. It is one of the most abundant species of *Ramalina* on Rarotonga, although it is less widely distributed than its common associate *R. luciae*. *Ramalina leiodea* is most commonly seen in coastal area and along the island's ring plain. However, it does extend up to at least 500 m a.s.l., where it grows mostly on wind-shorn trees such as mato (*Homalium acuminatum*), pua (*Fagraea berteroana*), and rata (*Metrosideros collina* agg.). It occurs in the same sites and on the same hosts as *R. luciae*. It is also known from the Bonin Islands, Marianas Islands, Mauritius, Reunion, Australia, Lord Howe Island, Norfolk Island, New Caledonia, Vanuatu and the Hawaiian Islands (Stevens 1987).

SPECIMENS EXAMINED
Cook Islands: *Rarotonga*: • Titikaveka, 21°16′S, 159°46′W, 1 m, local. Corticolous on *Cocos nucifera*. Associated also with *Hibiscus tiliaceus,* and *Barringtonia asiatica*, *P.J. de Lange 4433*, 3.ix.2000 (AK 281602); • Avarua, 21°12′18.77″S, 159°46′11.75″W, 7 m, on south face of coconut palm 4 m back from the high water mark, *K.M. Simon*, 18.iv.2003 (Unitec 004097); • Avarua, 21°12′23.07″S, 159°46′33.18″W, on iron bark, *K.M. Simon*, 18.iv.2003 (Unitec 004096); • Maungatea Bluff, Maungatea Ridgeline, 21°13′20.5″S, 159°46′49.68″W, 355 m, common on *Homalium acuminatum* branches. Associated with *Ramalina luciae*, *P.J. de Lange & T.J. Martin CK70*, 7.vii.2010 (AK 323272).

Acknowledgements
We thank Katrina Simon and Mel Galbraith for collections**,** and Ewen Cameron (AK) and the curators of MIN and MSC for loans of specimens, W for photographing the type specimen of *Ramalina microspora*, and Jennifer Bannister for her description of the type. PdL thank**s** Gerald McCormack (Director, Cook Islands Biodiversity and Natural Heritage) and Tim Martin (Wildlands New Zealand Ltd) for company in the field. Jeremy Rolfe kindly prepared the map for Figure 1. We are grateful to Gerald McCormack, David Galloway and Jennifer Bannister for their comments on an earlier version of the manuscript.

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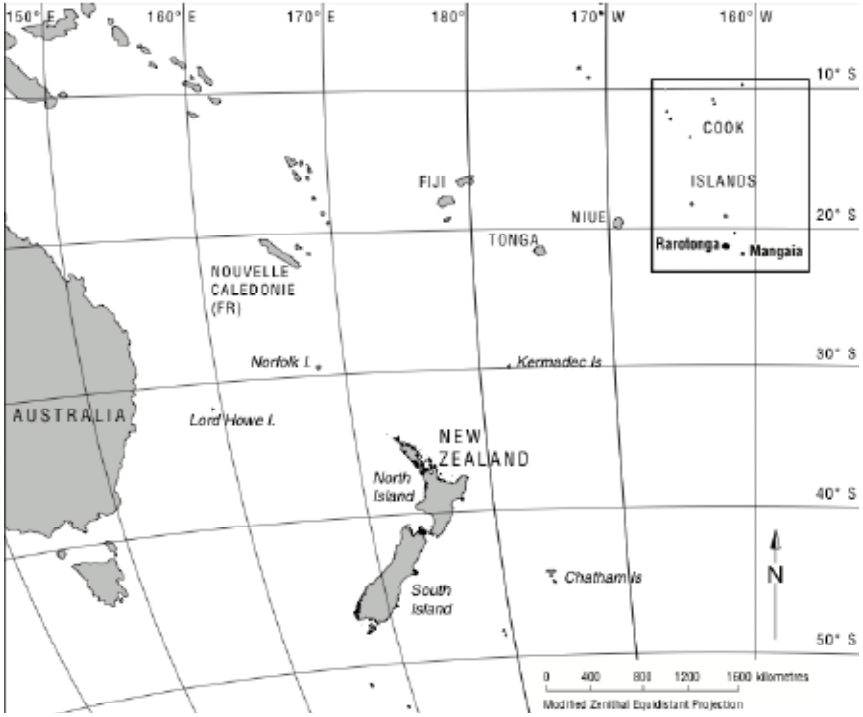

Fig. 1. Position of Rarotonga and Mangaia in the Cook Islands.

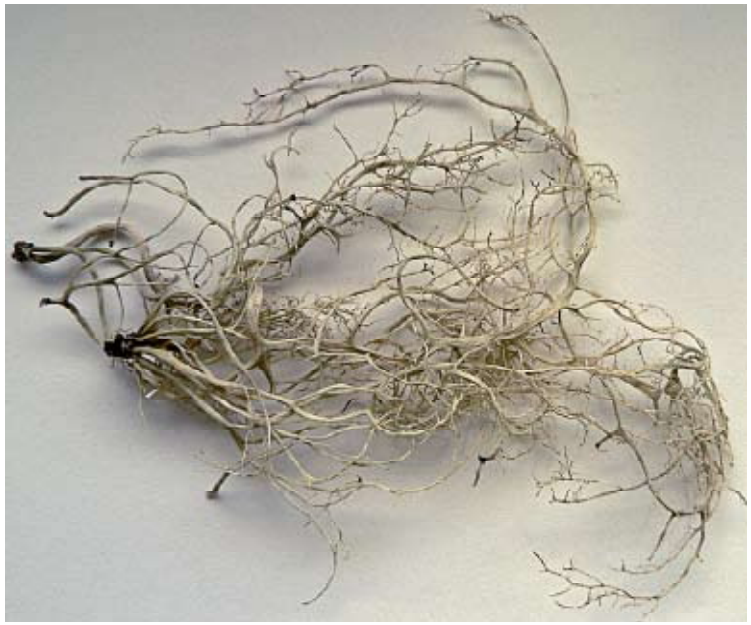
Fig. 2. *Ramalina australiensis*, AK 323275. 5 mm


Fig. 3. *Ramalina microspora*, AK 323276. 1 mm

Fig. 4. *Ramalina peruviana*, AK 323274. 5 mm

Typification of *Austrographa* Sparrius, Elix & A.W.Archer

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The description of the genus *Austrographa* (Roccellaceae) by Sparrius *et al.* (2010) was not accompanied by the designation of the type species, thus making the genus name illegitimate. That situation is rectified here.

Austrographa Sparrius, Elix & A.W.Archer, in *Australasian Lichenology* **67**, 23 (2010).

Type species: *Austrographa kurriminensis* Sparrius, Elix & A.W.Archer, in *Australasian Lichenology* **67**: 24 (2010).

The authors thank Linda in Arcadia for reporting the omission.

Reference

Sparrius, LB; Elix, JA; Archer, AW (2010): *Austrographa*, a new genus in the Roccellaceae with three species from Australia. *Australasian Lichenology* **67**, 23–28.

Further new species and new records of *Heterodermia* (Physciaceae, Ascomycota) from Australia

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Abstract: *Heterodermia coralloidea* Elix, *H. isidiophorella* Elix, *H. koyanoides* Elix, *H. tabularis* Elix, *H. tasmanica* Elix and *H. violostriata* Elix are described as new to science. The components of the *japonica* chemosyndrome of triterpenes are documented, and *H. lepidota* Swinscow & Krog, *H. stellata* (Vain.) W.A.Weber and *H. subisidiosa* (Kurok.) Kurok. are reported as new to Australia.

The genus *Heterodermia* Trevis. is well represented in Australia (Elix 2010a,b, 2011; McCarthy 2011), and although more than 35 species have been recorded for the country (Kurokawa 1962, 1973; McCarthy 2011), further undescribed and previously unreported species continue to be discovered. The morphological and chemical characters used to segregate *Heterodermia* taxa have been discussed previously (Lücking *et al.* 2008; Elix 2010, 2011). 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.

The New Species

Heterodermia coralloidea Elix, sp. nov. Fig. 1
Sicut *Heterodermia isidiophora* sed phyllidiis erumpentis et coralloidibus et acidum norsticticum continente differt.

Type: Australia. *Australian Commonwealth Territory*: Jervis Bay, Stoney Creek, 34 km SE of Nowra, 35°10′S, 150°45′E, 2 m, on sandstone beside creek in dry sclerophyll forest with numerous shrubs and *Livistonia*, *J.A. Elix 26421,* 8.xi.1990 (holotype – CANB).

Thallus foliose, orbicular to irregular, loosely adnate, 2–7 cm wide. *Lobes* 0.7–1.5 mm wide, ±flat, sublinear-elongate, dichotomously or irregularly branched, ±discrete to contiguous at the periphery, with short lateral lobes; apices not ascending, eciliate, but often with white marginal rhizines. *Upper surface* whitish grey, phyllidiate; phyllidia laminal and marginal, dissected and erumpent, forming dense, coralloid pseudoisidia that cover most of the upper surface. *Medulla* white. *Lower surface* corticate, white to cream or pale tan near the centre, rhizinate; rhizines white, concolorous with the thallus or becoming pale to dark brown towards the apices, simple to irregularly branched, numerous, 0.3–1.0 mm long, ±projecting beyond the lobe margin. *Apothecia* and pycnidia not seen.
Chemistry: Cortex K+ yellow, C–, KC–, P+ pale yellow; medulla K+ yellow then red, C–, P+ pale orange; containing atranorin (major), zeorin (major), norstictic acid (major), 16β-acetoxyhopane-6α,22-diol (major), leucotylin (minor), 6α-acetoxyhopane-16β,22-diol (trace), 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid (trace or absent), connorstictic acid (trace).

Etymology: The specific epithet is derived from the Latin *coralloides* (coral-like) in reference to the dense pseudoisidia.

Notes:
Heterodermia coralloidea is distinguished by the loosely adnate, foliose thallus with sublinear-elongate lobes with a corticate lower surface, pale marginal rhizines and marginal and laminal phyllidia that erupt to form dense coralloid pseudoisidia, and the presence of zeorin, norstictic acid and 16β-acetoxyhopane-6α,22-diol in the medulla. Morphologically, it resembles *H. isidiophora* (Nyl.) D.D.Awasthi, but that species has simple coralloid isidia that can be dorsiventral at first and then cylindrical, but which do not become granular or erupt with age. Furthermore, *H. isidophora* lacks medullary norstictic acid. Some morphotypes of *H. dissecta* (Kurok.) D.D.Awasthi resemble *H. coralloidea*, but the former contains dissectic acid as a major metabolite.
Heterodermia coralloidea is known from only the south-eastern Australian type locality. Associated species include *Dirinaria applanata* (Fée) D.D.Awasthi, *Heterodermia hypocaesia* Yasuda, *Hypotrachyna osseoalba* (Vain.) Y.S.Park & Hale, *Parmelia erumpens* Kurok., *Parmotrema reticulatum* (Taylor) M.Choisy, *P. tinctorum* (Nyl.) Hale, *Pertusaria subventosa* Malme, *P. xanthoplaca* Müll.Arg. and various *Xanthoparmelia* species.

Heterodermia isidiophorella Elix, sp. nov. Fig. 2
Sicut *Heterodermia isidiophora* sed diminutus, lobis angustioribus et terpenum continenti differt.

Type: Australia. *Queensland*: Cook district, Mount Windsor Tableland, 45 km NW of Mossman, 16°15′S, 145°01′E, 1200 m, on *Flindersia* in stunted, open rainforest, *J.A. Elix 16465 & H. Streimann,* 26.vi.1984 (holotype – CANB).

Thallus small-foliose, orbicular to irregular, adnate, 2–5 cm wide. *Lobes* 0.15–0.5(–1.0) mm wide, ±flat, sublinear-elongate, dichotomously or irregularly branched, ±discrete to contiguous at the periphery, with short lateral lobes; apices not ascending, eciliate, but often with white marginal rhizines. *Upper surface* whitish grey, isidiate or phyllidiate; isidia laminal and marginal, cylindrical to sublobulate or phyllidiate, simple to sparingly branched, at length becoming granular and sorediate. *Medulla* white. *Lower surface* corticate, white to pale tan or brown near centre, rhizinate; rhizines white, concolorous with the thallus or becoming pale to dark brown towards the apices, simple to irregularly branched, numerous, mainly marginal, 0.5–1.0 mm long, ±projecting beyond the lobe margin. *Apothecia* and pycnidia not seen.
Chemistry: Cortex and medulla K+ yellow, C–, KC–, P+ pale yellow; containing atranorin (major), zeorin (major), 6α-acetoxyhopane-16β,22-diol (major), 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid (trace), leucotylin (minor or trace), 16β-acetoxyhopane-6α,22-diol (trace or absent).

Etymology: The specific epithet is derived from the similarity of this species to *H. isidiophora* (Nyl.) D.D.Awasthi, combined with the Latin suffix *-ellus* (diminutive).

Notes:
Heterodermia isidiophorella is distinguished by the small, adnate thallus with very narrow, sublinear-elongate lobes with pale marginal rhizines and cylindrical to lobulate or phyllidiate isidia that become granular and sorediate with age. The medulla contains a preponderance of zeorin and 6α-acetoxyhopane-16β,22-diol. Morphologically, it closely resembles *H. isidiophora*, but that species has larger, loosely adnate thalli (7–20 cm wide *versus* 2–5 cm wide) with broader lobes (0.7–2.5 mm *versus* 0.15–1.0 mm wide), simple to coralloid isidia that can be dorsiventral at first and then cylindrical and do not become granular with age. *Heterodermia isidiophora* contains zeorin and 16β-acetoxyhopane-6α,22-diol as major triterpenes.
Heterodermia isidiophorella is known from eastern Queensland and New South Wales, where it occurs on bark and twigs, rarely on mossy rocks, in montane and coastal forests. Associated species include *Dirinaria applanata* (Fée) D.D.Awasthi, *Heterodermia hypocaesia* Yasuda, *H. hybocarponica* Elix, *H. queenslandica* Elix, *Menegazzia fissicarpa* P. James, *Pseudocyphellaria desfontainii* (Delise) Vain., *P. intricata* (Delise) Vain., *Parmotrema reticulatum* (Taylor) M.Choisy, *P. tinctorum* (Nyl.) Hale, *Pertusaria velata* (Turner) Nyl., *Sticta sayeri* Müll.Arg. and *Usnea pectinata* Taylor.

SPECIMENS EXAMINED
Queensland: • Kennedy North district, Ravenshoe State Forest, along the Tully Falls road, 23 km SE of Ravenshoe, 17°49′S, 145°33′E, 780 m, on sapling along the rainforest margin, *J.A. Elix 16024 & H. Streimann,* 23.vi.1984 (CANB); • type locality, on mossy

trunk of *Syzygium* and *Flindersia*, *J.A. Elix 16464, 16470 & H. Streimann*, 26.vi.1984 (CANB); • Cook district, Hugh Nelson Range, along Plath Road, 15 km S of Atherton, 17°25′S, 145°26′E, 1080 m, on base of *Eucalyptus grandis* in *E. grandis* woodland, *J.A. Elix 16357 & H. Streimann*, 25.vi.1984 (CANB); • Kennedy North district, Walter Hill Range, 26 km SE of Ravenshoe, 17°46′S, 145°41′E, 890 m, on canopy twigs of felled tree in rainforest, *J.A. Elix 17060 & H. Streimann*, 2.vii.1984 (CANB); • Mount Lewis State Forest, 13 km WSW of Mossman, 16°29′S, 145°16′E, 1080 m, on fallen tree branch in rainforest, *H. Streimann 46076B*, 7.xii.1990 (CANB).
New South Wales: • Central Coast, Brisbane Water National Park, overlooking Woy Woy, 33°28′S, 151°21′E, 20 m, on moss over sandstone boulders, *J.A. Elix 761*, 27.iv.1975 (CANB).

Heterodermia koyanoides Elix, sp. nov. Fig. 3
Sicut *Heterodermia koyana* sed superfice sorediatis et soraliis capitatibus differt.

Type: Australia. *Queensland*: Cook district, Great Dividing Range, Mt Baldy, 4 km SW of Atherton, 17°16′S, 145°23′E, 1080 m, on sapling along margin of regrowth rainforest, *J.A. Elix 16308 & H. Streimann*, 25.vi.1984 (holotype – CANB).

Thallus foliose, orbicular to irregularly spreading, loosely adnate, 5–10 cm wide. *Lobes* 0.7–2.0 mm wide, flat to weakly convex or weakly concave, sublinear-elongate, dichotomously to subdigitately branched, the lobe tips not ascending, ±discrete to contiguous at the periphery, with short lateral lobes, eciliate. *Upper surface* whitish grey, sorediate; soralia marginal and at the apices of short lateral lobes, capitate, 0.5–1.2 mm wide, the soredia granular. *Medulla* white. *Lower surface* corticate, white to greyish to pale brown at the centre, rhizinate; rhizines numerous, mainly marginal, concolorous with the thallus, ±irregularly branched, 0.3–1.0 mm long, ±projecting beyond the lobe margin. *Apothecia* and pycnidia not seen.
Chemistry: Cortex and medulla K+ yellow, C–, KC–, P+ pale yellow; containing atranorin (major), zeorin (major), 16β-acetoxyhopane-6α,22-diol (major), leucotylin (minor), 6α-acetoxyhopane-16β,22-diol (trace), 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid (trace or absent), dissectic acid (major or minor).

Etymology: The specific epithet is derived from the Latin suffix *-oides* (resembling) in reference to the overall similarity of this species and *Heterodermia koyana* (Kurok.) Elix.

Notes:
Heterodermia koyanoides is distinguished by the loosely adnate, foliose thallus with sublinear-elongate lobes with a corticate lower surface, the capitate soralia at the lobe margins and the apices of short lateral lobes, and the presence of zeorin, dissectic acid and 16β-acetoxyhopane-6α,22-diol in the medulla. Morphologically and chemically it resembles *H. koyana*, but that species has marginal phyllidiate isidia or minutely dissected, dorsiventral lobules that often become granular near the tips. In some morphotypes of *H. koyana* the whole lobule (phyllidium) can become granular, so that the lobe margins appear to be sorediate (in part), but they do not develop capitate soralia, nor is the thallus elobulate.
Heterodermia koyanoides is known only from the type locality in north-eastern Queensland. Associated species include *Dirinaria applanata* (Fée) D.D.Awasthi, *Heterodermia hypocaesia* Yasuda, *H. hybocarponica* Elix, *H. queenslandica* Elix, *Menegazzia fissicarpa* P.James, *Pseudocyphellaria desfontainii* (Delise) Vain., *P. intricata* (Delise) Vain., *Parmotrema reticulatum* (Taylor) M.Choisy, *P. tinctorum* (Nyl.) Hale, *Pertusaria velata* (Turner) Nyl., *Sticta sayeri* Müll.Arg. and *Usnea pectinata* Taylor.

Heterodermia tabularis Elix, sp. nov. Figs 4 & 5
Sicut *Heterodermia trichophoroides* sed lobis lobulatis, ascosporis brevioribus et multisporoblastidiatis differt.

Type: Australia. *Queensland*: Big Tableland, 26 km S of Cooktown, 15°43′S, 145°16′E, 580 m, on stem of old lemon tree in grassland with scattered shrubs and treelets on gentle slope, *H. Streimann 46346*, 11.xii.1990 (holotype – CANB).

Thallus foliose to subfruticose, forming small rosettes or irregularly spreading, adnate to loosely adnate, 2–4 cm wide. *Lobes* 0.5–2 mm wide, sublinear, convex to ±flat or weakly concave, irregularly to subdichotomously branched, suberect or ascending at apices, partially imbricate, discrete to adjacent, ciliate, with whitish cilia along margins; cilia scattered, simple, 0.5–1.3 mm long, not mat-forming. *Upper surface* greyish white to whitish to cream-coloured, epruinose, lobulate, soredia and isidia absent; lobules marginal, more pronounced subapically, ±rotund to elongate, simple or sparingly branched, 0.05–0.3 mm wide. *Medulla* white. *Lower surface* ecorticate, arachnoid, ±canaliculate, whitish, rhizinate; rhizines simple to dichotomously or irregularly branched, whitish, 0.5–2 mm long, ±projecting beyond the margin. *Apothecia* common, subterminal, stipitate, 1–3.5 mm wide, situated subterminally on ascending lobes; thalline exciple persistent, concolorous with the thallus, margin crenate or with well-developed lobules, ciliate; disc brown to dark brown, densely white-pruinose. *Ascospores Polyblastidia*-type, ellipsoid, containing numerous sporoblastidia, 30–40 × 15–20 μm. *Pycnidia* common, immersed, then becoming emergent, visible as black dots; conidia bacilliform, 4–5 × 1 μm.
Chemistry: Cortex K+ yellow, C–, KC–, P+ pale yellow; medulla K+ yellow then red, C–, P+ dark yellow or yellow-orange; containing atranorin (major), zeorin (major), 6α-acetoxyhopane-16β,22-diol (minor), 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid (trace), leucotylin (trace), norstictic acid (major), connorstictic acid (minor), testacein (minor).

Etymology: The specific epithet is derived from the Latin *tabularis* (flattened horizontally) in reference to the type locality, Big Tableland, in north Queensland.

Notes:
Both *H. tabularis* and *H. trichophoroides* (Kurok.) Kurok. are characterized by narrow lobes with marginal cilia, the lack of soredia and isidia, stipitate apothecia with ciliate margins, *Polyblastidia*-type ascospores and the presence of atranorin, zeorin and norstictic acid. However, *H. tabularis* has subterminal lobules along the lobe margins (*H. trichophoroides* is elobulate), shorter ascospores (30–40 × 15–20 μm *versus* 39–49 × 17–22 μm) that contain numerous sporoblastidia (*H. trichophoroides* has 2 or 3 sporoblastidia at both ends). The sporoblastidia in mature ascospores of *H. tabularis* resemble those of *H. boryi* (Fée) K.P.Singh & S.R.Singh (as depicted by S. Kurokawa, 1962, plate 1, fig. 6 – as *Anaptychia neoleucomelaena* Kurok.).
Heterodermia tabularis is known only from the type locality in north-eastern Queensland. Associated species include *Canoparmelia texana* (Tuck.) Elix & Hale, *Coccocarpia palmicola* (Spreng.) Arv. & D.J.Galloway, *Leptogium austroamericanum* (Malme) C.W.Dodge, *L. cyanescens* (Rabenh.) Körb., *Lobaria pseudoretigera* Sipman, *Menegazzia fissicarpa* P.James, *Parmotrema crinitum* (Ach.) M.Choisy, *Pseudocyphellaria desfontainii* (Delise) Vain., *P. intricata* (Delise) Vain. and *Relicina limbata* (Laurer) Hale.

Heterodermia tasmanica Elix, sp. nov. Fig. 6
Sicut *Heterodermia hybocarponica* sed superfice lobulatis et esorediatis differt.

Type: Australia. *Tasmania*: Ferndene Gorge, 5 km S of Penguin, 41°09′S, 146°02′E, on dead wood in wet sclerophyll forest, *J.A. Elix 5685*, 21.i.1979 (CANB – holotype).

Thallus foliose, orbicular to irregularly spreading, loosely adnate, to 5 cm wide, but often coalescing to form colonies up to 10 cm wide. *Lobes* 0.5–1.2 mm wide but ±widening to c. 2–3 mm wide at the tips, flat to weakly convex or weakly concave, sublinear-elongate, dichotomously branched, radiating, the lobe tips ascending, usually discrete; isidia and soredia absent. *Upper surface* greenish white, whitish to

cream-coloured, with marginal, dorsiventral lobules, more rarely also laminal, lobules ±rotund or sparingly branched, 0.3–0.8 mm wide, ±minutely dissected or granular near tips. *Medulla* white. *Lower surface* ecorticate, arachnoid, purple-black in the centre, white, ochraceus or yellow towards the apices, rhizinate; rhizines marginal, simple, black, 1–3(–7) mm long. *Apothecia* and pycnidia not seen.
Chemistry: Cortex and medulla K+ yellow, C–, KC–, P+ pale yellow; containing atranorin (major), zeorin (major), japonin (major), hybocarpone (major or minor), norhybocarpone (minor or trace), 7-chloroemodin (trace), dissectic acid (trace), chloroatranorin (minor).

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

Notes: *Heterodermia tasmanica* is distinguished by the narrow, sublinear-elongate lobes with an ecorticate lower surface that is pigmented ochraceus or yellow towards the apices, the presence of marginal lobules that can become granular near the tips, and in containing atranorin, zeorin, hybocarpone and the *japonica* chemosyndrome of triterpenes (see below). It is morphologically similar to *H. flavosquamosa* Aptroot & Sipman, but that species lacks hybocarpone but contains the leucotylin chemosyndrome of triterpenes (16β-acetoxyhopane-6α,22-diol, 6α-acetoxyhopane-16β,22-diol, 6α,16β-diacetoxyhopane-22-ol and leucotylin). Chemically, *H. tasmanica* is identical to *H. hybocarponica* Elix, but that species is sorediate.

Heterodermia tasmanica is known only from the Tasmanian type locality. Associated species include *Heterodermia hybocarponica* Elix, *Hypotrachyna osseoalba* (Vain.) Y.S.Park & Hale, *Leioderma sorediatum* D.J.Galloway & P.M.Jørg., *Lepraria cupressicola* (Hue) J.R.Laundon, *Megalaria grossa* (Pers. ex Nyl.) Hafellner, *Pannaria leproloma* (Nyl.) P. M.Jørg., *P. microphyllizans* (Nyl.) P.M.Jørg., *Parmelia erumpens* Kurok., *Parmelinopsis horrescens* (Taylor) Elix & Hale, *Parmotrema reticulatum* (Taylor) M.Choisy, *Pertusaria erythrella* Müll.Arg. and *Usnea confusa* Asahina.

Heterodermia violostriata Elix, sp. nov. Fig. 7
Sicut *Heterodermia microphylla* sed subtus violaceo-striatus et ascosporae sporoblastiadibus differt.

Type: Australia. *Queensland*: Paluma Village, Paluma Range, 40 km S of Ingham, 19°01′S, 146°13′E, 830 m, on stem of exotic tree in maintained garden, *H. Streimann 58057*, 29.x.1995 (CANB – holotype).

Thallus foliose, orbicular to irregularly spreading, loosely adnate, up to 5 cm wide but often forming colonies up to 12 cm wide. *Lobes* 1.0–1.5 mm wide but ±widening to c. 2–3 wide mm at the tips, flat to weakly convex or weakly concave, sublinear-elongate, dichotomously to digitately branched, radiating, the lobe-tips not ascending, contiguous to discrete, eciliate; isidia absent; soredia present or absent. *Upper surface* greenish white, whitish grey to cream, epruinose, with marginal dorsiventral lobules, more rarely also laminal, usually minutely dissected, often granular near the tips or entire lobules becoming granular and appearing sorediate. *Medulla* white. *Lower surface* ecorticate, arachnoid, violet-grey in the centre, violet-striate towards the apices, yellow pigments absent; rhizines marginal, simple and concolorous with the lower surface at first, then black and squarrosely branched, 2–4 mm long. *Apothecia* rare, laminal, adnate to substipitate, 1–4 mm wide; thalline exciple persistent, concolorous with the thallus; margin lobulate, the lobules becoming elongated and deeply dissected; disc concave, dark brown to blackish brown, ±thinly grey-pruinose. Asci cylindrical to subclavate, 8-spored. Ascospores *Polyblastidia*-type, brown, 1-septate, ellipsoid, with 0–2 sporoblastidia, 30–45 × 15–25 μm. *Pycnidia* common, immersed, then becoming emergent, visible as black dots; conidia bacilliform, 4–5 × 1 μm.
Chemistry: Cortex and medulla K+ yellow, C–, P+ pale yellow; containing atranorin (major), zeorin (major), 16β-acetoxyhopane-6α,22-diol (major or minor), leucotylin (minor), 6α-acetoxyhopane-16β,22-diol (minor or major), 6α,16β-diacetoxyhopane-22-ol (minor or trace), chloroatranorin (minor or trace).

Etymology: The specific epithet refers to the violet striations on the ecorticate lower surface.

Notes:
Heterodermia violostriata is characterized by narrow, sublinear-elongate lobes with an ecorticate, violet-striate lower surface, marginal lobules, ascospores with sporoblastidia and the presence of triterpenes in the medulla. It was previously misidentified as *H. microphylla* (Kurok.) Swinscow & Krog or *H. fragilissima* (Kurok.) J.-C.Wei & J.-M.Jiang. All three species are characterized by densely lobulate lobe margins and an ecorticate lower surface. However, in *H. microphylla* the *Pachysporaria*-type ascospores lack sporoblastidia, and the lower surface is predominantly white or pale, whereas the other two species have *Polyblastidia*-type ascospores and a sordid brown to violet-striate lower surface. *Heterodermia violostriata* differs from *H. fragilissima* in having somewhat shorter ascospores with fewer sporoblastidia and in containing the leucotylin chemosyndrome of triterpenes rather than the *japonica* chemosyndrome. The American species *H. squamulosa* (Degel.) W.L.Culb. is morphologically similar to *H. violostriata* and chemically identical. However, the former has smaller and much narrower ascospores (26–37 × 11–16 μm *versus* 30–45 × 15–25 μm).

Heterodermia violostriata is common on trees in coastal and montane rainforests of eastern Australia. Associated species include *Dirinaria applanata* (Fée) D.D.Awasthi, *Heterodermia hybocarponica* Elix, *Hypotrachyna osseoalba* (Vain.) Y.S.Park & Hale, *Leioderma sorediatum* D.J.Galloway & P.M.Jørg., *Lepraria cupressicola* (Hue) J.R.Laundon, *Megalaria grossa* (Pers. ex Nyl.) Hafellner, *Parmelia erumpens* Kurok., *Parmelinopsis horrescens* (Taylor) Elix & Hale, *Pertusaria erythrella* Müll.Arg., *P. subplanaica* A. W.Archer & Elix, *Usnea molliuscula* Stirt. subsp. *molliuscula* and *Vainionora aemulans* (Vain.) Kalb.

SPECIMENS EXAMINED
Queensland: • Kennedy North district, Kirrima State Forest, Cardwell Range, 24 km WNW of Cardwell, 18°12′S, 145°48′E, 750 m, on felled tree in rainforest, *J.A. Elix 15648, 15716 & H. Streimann,* 20.vi.1984 (CANB); • Kennedy North district, Lannercost State Forest, North Wallaman logging area, 36 km NW of Ingham, 18°36′S, 145°50′E, 600 m, on tree and canopy twigs in disturbed rainforest, *J.A. Elix 15827, 15831 & H. Streimann,* 21.vi.1984 (CANB); • Cook district, Great Dividing Range, Mt Baldy, 4 km SW of Atherton, 17°16′S, 145°23′E, 1060 m, on sapling along margin of regrowth forest, *J.A. Elix 16316 & H. Streimann,* 25.vi.1984 (CANB); • Kennedy North district, along the Tully Falls road, 8 km SE of Ravenshoe, 17°40′S, 145°31′E, 940 m, on remnant roadside trees, *J.A. Elix 16772, 16804 & H. Streimann,* 29.vi.1984 (CANB); • Cook district, Main Coast Range, track to Mt Lewis, 19 km NNW of Mount Molloy, 16°31′S, 145°16′E, 1200 m, on fallen tree in rainforest, *J.A. Elix 16932 & H. Streimann,* 30.vi.1984 (CANB); • Kennedy North district, Walter Hill Range, 26 km SE of Ravenshoe, 17°46′S, 145°41′E, 890 m, on canopy of felled tree in rainforest, *J.A. Elix 17068 & H. Streimann,* 2.vii.1984 (CANB); • Cook district, Big Tableland, 26 km S of Cooktown, 15°43′S, 145°16′E, 610 m, on sapling along margin of stunted rainforest, *J.A. Elix 17302, 17303 & H. Streimann,* 4.vii.1984 (CANB); • Cook district, slopes of Black Mountain, 25 km NW of Kuranda, 16°40′S, 145°29′E, 500 m, on *Acacia* in stunted rainforest, *J.A. Elix 17519, 17522A & H. Streimann,* 7.vii.1984 (CANB); • Tully Gorge, 49 km NW of Tully, 17°45′20″S, 147°37′39″E, 145 m, on trunk of fallen tree along margin of rainforest, *J.A. Elix 36978,* 28.vii.2006 (CANB); • Paluma Rainforest Walk, Paluma, 19°00′27″S, 146°12′24″E, 830 m, on tree trunk at margin of rainforest, *J.A. Elix 37597,* 24.viii.2006 (CANB); • Ellinjaa Falls, 5 km ENE of Millaa Millaa, 17°29′38″S, 145°39′20″E, 705 m, on treelet in remnant rainforest, *J.A. Elix 39621,* 29.vii.2006 (CANB); • Arthur Bailey Road, 9 km SSE of Ravenshoe, 17°41′S, 145°30′E, 900 m, on tree trunk in rainforest, *H. Streimann 46155,* 8.xii.1990 (B, CANB); • Big Tableland, 26 km S of Cooktown, 15°43′S, 145°16′E, 580 m, on treelet stem in remnant rainforest, *H. Streimann 46282,* 11.xii.1990 (B, CANB).

New South Wales: • Southern Tablelands, Clyde Mountain, above the road, 35°33′S, 149°57′E, 700 m, on base of large *Eucalyptus* in wet sclerophyll forest, *J.A. Elix 1290,* 29.x.1975 (CANB); *J.A. Elix 1789, 1791,* 29.i.1976 (CANB); • South Coast, along trail to Pigeon House Mountain, 15 km W of Ulladulla, 35°21′S, 150°16′E, 600 m, on mossy sandstone rocks in dry sclerophyll forest, *J.A. Elix 3922,* 29.ix.1977 (CANB); • Mount Hyland Nature Reserve, 20 km N of Hernani, 30°10′44″S, 152°25′19″E, 1340 m, on base of *Eucalyptus nobilis* in temperate rainforest, *J.A. Elix 36630,* 30.iv.2005 (CANB); • Gloucester Tops, Barrington Tops National Park, 36 km WSW of Gloucester, 32°04′S, 151°39′E, 1300 m, on treelet in open *Nothofagus*-dominated forest, *H. Streimann 44036,* 23.iv.1990 (CANB).
Victoria: • Gippsland region, Alfred National Park, 19 km E of Cann River, 37°32′S, 149°20′E, 350 m, on tree trunk in rainforest, *J.A. Elix 5251,* 21.xi.1978 (CANB).
Tasmania: • Sumac Road, spur 2, S of Arthur River, 41°08′S, 145°02′E, 170 m, on canopy branches of *Eucryphia* in rainforest, *J.A. Elix 40179, 40181 & G. Kantvilas,* 8.xii.1993 (CANB); 41°06′S, 144°50′E, 170 m, on *Eucryphia* in rainforest, *G. Kantvilas 277/81,* 20. v.1981 (CANB).

New Records

Heterodermia lepidota Swinscow & Krog, *Lichenologist* **8**, 122 (1976)
This lichen is characterized by simple to dissected, marginal and ±laminal phyllidia, a corticate lower surface with pale to black rhizines, *Pachysporaria*-type ascospores lacking sporoblastidia, and the presence of atranorin and triterpenes (Swinscow & Krog 1976). It was previously known from East Africa.
Chemistry: Cortex K+ yellow, C–, KC–, P+ yellow; medulla K+ yellow, C–, P+ pale yellow; containing atranorin (major), zeorin (major), 16β-acetoxyhopane-6α,22-diol (major), 6α-acetoxyhopane-16β,22-diol (minor or trace), leucotylin (minor), 6α,16β-diacetoxyhopane-22-ol (minor or trace).

SPECIMEN EXAMINED
New South Wales: • South Coast, Sugarloaf Creek, Misty Mountain Road, Currowan State Forest, 35°35′S, 150°03′E, 100 m, on dead log in wet sclerophyll forest beside creek, *J.A. Elix 21564*, 14.vii.1987 (CANB).

Heterodermia stellata (Vain.) W.A.Weber, *Mycotaxon* **13**, 102 (1981). Fig. 8
This species is characterized by lobes with white marginal cilia, a lack of vegetative propagules, the subterminal, substipitate or stipitate apothecia with an eciliate margin, the white, ecorticate lower surface, ascospores with sporoblastidia and the presence of atranorin, zeorin and triterpenes (Kurokawa 1962). It was previously known from Central and South America.
Chemistry: Cortex K+ yellow, C–, KC–, P+ yellow; medulla K+ yellow, C–, P+ pale yellow; containing atranorin (major), zeorin (major), 6α-acetoxyhopane-16β,22-diol (minor), 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid (minor), leucotylin (trace), 16β-acetoxy-6α,22-dihydroxyhopane-25-oic acid (trace).

SPECIMEN EXAMINED
New South Wales: • Berrico Road, Chichester State Forest, 21 km SW of Gloucester, 32°06′S, 152°46′E, 900 m, on fallen twigs in cool-temperate rainforest on ridge, *J.A. Elix 25015*, 27.iv.1990 (CANB).

Heterodermia subisidiosa (Kurok.) Kurok., *Folia Cryptog. Estonica* **32**, 23 (1998). Fig. 9
Heterodermia subisidiosa is characterized by marginal isidia, a white, ecorticate lower surface, ascospores with sporoblastidia (Kurokawa 1962) and the presence of atranorin and triterpenes. It was previously known from Mexico.
Chemistry: Cortex K+ yellow, C–, KC–, P+ yellow; medulla K+ yellow, C–, P+ pale yellow; containing atranorin (major), zeorin (major), japonin (minor or trace), 6α-acetoxyhopane-16β,22-diol (trace), 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid (trace), anaptychin 1 (trace), ±16β-acetoxy-6α,22-dihydroxyhopane-25-oic acid (trace).

SPECIMEN EXAMINED
Queensland: • Mount Lewis State Forest, 13 km WSW of Mossman, 16°29′S, 145°16′E, 1080 m, on fallen tree branch in rainforest, *H. Streimann 46078*, 7.xii.1990 (CANB).

The *japonica* chemosydrome of triterpenes
The first detailed chemotaxonomic survey of *Heterodermia* was undertaken by Kurokawa (1973), who utilized thin-layer chromatographic analysis using the solvent system hexane-diethyl ether-formic acid (10:8:1) and silica gel plates. More particularly, he distinguished the array of triterpenes present in many species, for example the common species *H. obscurata* (Nyl.) Trevis. (zeorin, anaptychin-2 [= 16β-acetoxyhopane-6α,22-diol], N-3 [6α,16β-diacetoxyhopane-22-ol], leucotylin [trace] and ±anaptychin 1) and *H. japonica* (Sato) Swinscow & Krog (zeorin, N-5, anaptychin-5, and traces of anaptychin-1, anaptychin-3 and anaptychin-4). More recently, Lendemer (2009) reported the TLC behavior of some North American species of *Heterodermia* using solvent C [toluene-acetic acid in ratio 85:15], but did not identify the minor triterpenes present. Some of Kurokawa's results were equivocal because the single solvent system did not discriminate all the triterpenes present, in particular the substance he termed 'N-5' detected in *H. japonica* and other common species including *H. diademata* (Taylor) D.D.Awasthi, *H. tremulans* (Müll.Arg.) W.L.Culb. and *H. speciosa* (Wulfen) Trevis. Those terpenes are not identical, and while the 'N-5' of *H. diademata, H. tremulans* and *H. speciosa* is identical with 6α-acetoxyhopane-16β,22-diol, it differs from that present in *H. japonica* (a triterpene of unknown structure, here termed japonin). Those substances can be distinguished by TLC using silica plates and the solvent systems E' [toluene-ethyl acetate (3:1)] in combination with solvent C (Tables 1, 2). The *japonica* chemosyndrome of triterpenes includes zeorin and japonin as major compounds.

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Table 1. TLC Rf values (×100) of triterpenes of the leucotylin chemosyndrome in three solvent systems.

Triterpene name	Rf C	Rf G	Rf E′
Zeorin [Hopane-6α,22-diol]	43	50	19
Leucotylin [Hopane-6α, 16β,22-triol]	25	30	4
6α-Acetoxyhopane-16β,22-diol	34	38	6
16β-Acetoxyhopane-6α,22-diol	32	36	8
6α,16β-Diacetoxyhopane-22-ol	40	45	19
6α-Acetoxy-16β,22-dihydroxyhopane-25-oic acid	30	34	4

Table 2. TLC Rf values (×100) of triterpenes of the *Japonica* chemosyndrome in three solvent systems.

Triterpene name			
Zeorin [Hopane-6α,22-diol]	43	50	19
Japonin	32	36	5
Anaptychin-5	53	58	40
Anaptychin-1	22	27	4
6α-Acetoxy-16β,22-dihydroxyhopane-25-oic acid	30	34	4

Fig. 1. *Heterodermia coralloidea* (holotype in CANB). 1 mm

Fig. 2. *H. isidiophorella* (holotype in CANB). 1 mm

Fig. 3. *H. koyanoides* (holotype in CANB). 1 mm

Fig. 4. *H. tabularis* (apothecia - holotype in CANB). 1 mm

Fig. 5. *H. tabularis* (lobes - holotype in CANB). 1 mm

Fig. 6. *H. tasmanica* (holotype in CANB). 5 mm

Fig. 7. *H. violostriata* (*J.A. Elix 36630* in CANB). 5 mm

Fig. 8. *H. stellata* (*J.A. Elix 25015* in CANB). 5 mm

Fig. 9. *H. subisidiosa* (*H. Streimann 46078* in CANB). 1 mm

Further new species and new records of *Physcia* (Physciaceae, Ascomycota) from Australia

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Abstract: *Physcia dactylifera* Elix and *P. kantvilasii* Elix are described as new to science. *Physcia erumpens* Moberg, *P. krogiae* Moberg and *P. rolfii* Moberg are new to Australia.

The genus *Physcia* (Schreb.) Michx. is well represented in Australia, and although 25 species have been recorded for the continent (Moberg 2001, Elix *et al.* 2009, Elix 2011, McCarthy 2011), undescribed and previously unreported species continue to be discovered.

Here, two new species are described and three taxa are reported from Australia for the first time. The morphological and chemical characters used to segregate *Physcia* taxa have been discussed previously (Moberg 2001, Elix *et al.* 2009, Elix 2011). 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.

Physcia dactylifera Elix, sp. nov. Fig. 1

Sicut *Physcia decorticata* sed lobi latiore, superfice frigus-pruinosus et 16β-acetoxyhopane-16α,22-diolum et 6α-acetoxyhopane-16β,22-diolum continenti differt.

Type: Australia. *Queensland*: Cook district, Cooktown road, 3 km NW of Mount Molloy, 16°40′S, 145°19′E, 450 m, on granite rocks in *Eucalyptus*-dominated grassland, *J.A. Elix 17197 & H. Streimann*, 3.vii.1984 (CANB – holotype).

Thallus orbicular or irregular, adnate throughout, to 8 cm wide. *Lobes* 0.8–1.5 mm wide, contiguous to imbricate in the centre, radiating at the periphery, irregularly branched, flat to weakly convex, the margins of the lobes entire; lobe tips truncate, weakly ascending, eciliate. *Upper surface* whitish grey to grey or dark grey, matt, emaculate, white-pruinose and appearing frosted especially near apices, dactylate isidia present; upper cortex pseudoparenchymatous. *Dactyls* laminal, 0.2–0.5 mm wide, becoming erumpent and developing into elevated pustules, stalked soralia or craters that sometimes coalesce to cover large parts of the upper surface; soredia coarsely granular, whitish or grey. *Lower surface* brown to dark brown or brown-black; rhizines sparse, concolorous with the lower surface, 0.4–0.6 mm long; lower cortex prosplectenchymatous. *Apothecia* juvenile, lacking ascospores. *Pycnidia* uncommon, immersed then emergent, visible as black dots; conidia subcylindrical, 4–6 × 1 μm. *Chemistry*: Cortex K+ yellow; medulla K+ yellow; containing atranorin (major), zeorin (major), 16β-acetoxyhopane-6α,22-diol (major), 6α-acetoxyhopane-16β,22-diol (minor), leucotylin (minor), 6α,16β-diacetoxyhopane-22-ol (minor), 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid (minor), 16β-acetoxy-6α,22-dihydroxyhopane-25-oic acid (trace).

Etymology: The specific epithet derives from the characteristic dactylate isidia present on the upper surface.

Notes:

Physcia dactylifera could be confused with *P. decorticata* Moberg (Moberg 2001) in that both have dactylate isidia that develop into pustules on the upper surface. However, the latter is distinguished by having narrower lobes (0.3–0.8 mm *versus* 0.8–1.5 mm), a fragile and cracked upper cortex that erodes in part, leaving the lobes decorticate (the upper cortex is frosted-pruinose and mainly intact in *P. dactylifera*),

and in containing a different cohort of triterpenes (the *speciosa* chemosyndrome). Chemically the new taxon is identical to *P. erumpens* Moberg, a species that has a dark brown to black-brown lower surface but lacks a frosted-pruinose upper surface. Furthermore, on its upper surface *P. erumpens* has crateriform soralia rather than dactyls. *Physcia krogiae* Moberg has a frosted-pruinose upper surface with erumpent pustules and a brown-black to black lower surface, but it lacks dactyls and contains the *speciosa* chemosyndrome of triterpenes.

At present *Physcia dactylifera* is known only from coastal and hinterland areas of north Queensland, where it grows on rocks and bark. Commonly associated saxicolous species include *Australiaena streimannii* Matzer, H.Mayrhofer & Elix, *Buellia vioxanthina* Elix, *Caloplaca leptozona* (Nyl.) Zahlbr., *Diploschistes actinostomus* (Pers.) Zahlbr., *Lepraria usnica* Sipman, *Parmotrema praesorediosum* (Nyl.) Hale, *P. reticulatum* (Taylor) M.Choisy and *Ramboldia petraeoides* (Nyl. ex C.Bab. & Mitt.) Kantvilas & Elix. Commonly associated corticolous species include *Dirinaria applanata* (Fée) D. D.Awasthi, *Caloplaca bassiae* (Willd. ex Ach.) Zahlbr., *Leptogium austroamericanum* (Malme) C.W.Dodge, *L. azureum* (Sw. ex Ach.) Mont., *Physcia atrostriata* Moberg, *Parmotrema reticulatum* (Taylor) M.Choisy, *P. tinctorum* (Nyl.) Hale and *Pyxine retirugella* Nyl.

SPECIMEN EXAMINED
Queensland: • track to Lugger Bay, 17 km E of Tully, 17°57′S, 146°05′E, 1 m, on dead tree trunk in strand vegetation dominated by *Calophyllum inophyllum* and *Hibiscus tiliaceus*, *H. Streimann 45436*, 1.xii.1990 (CANB).

Physcia kantvilasii Elix, sp. nov. Fig. 2
Sicut *Physcia tenella* sed superficie convexis et medulla K+ flavescens differt.

Type: Australia. *Tasmania*: Robbins Island Track, just N of Denium Hill, 25 km NW of Smithton, 40°44′S, 144°53′E, 2 m, on *Bursaria* in *Melaleuca* swamp, *J.A. Elix 40291 & G. Kantvilas*, 10.xii.1993 (CANB – holotype).

Thallus foliose, orbicular to irregularly spreading, adnate, 1–3 cm wide. *Lobes* 0.8–1.5 mm wide, broader at the tips, weakly to markedly convex, sublinear, irregularly branched, the lobe tips often ascending, with sparse, simple marginal cilia; cilia whitish, darkening at the tips or black, 0.2–0.7 mm long. *Upper surface* greenish white, whitish to cream-coloured, emaculate or rarely indistinctly white-maculate, smooth, matt, rarely white-pruinose, sorediate; soralia sparse, labriform on the underside of the lobe tips, soredia coarse, granular, white or greenish white; upper cortex pseudoparenchymatous. *Medulla* white. *Lower surface* corticate, white to pale brown, rhizinate; rhizines sparse to moderately dense subapically, simple to sparsely branched, whitish to brown or brown-black, 0.2–0.7 mm long; lower cortex prosoplectenchymatous to indistinctly pseudoparenchymatous. Apothecia and pycnidia not seen.
Chemistry: Cortex and medulla K+ yellow, C–, KC–, P+ pale yellow; containing atranorin (major), zeorin (major), 6α-acetoxyhopane-16β,22-diol (minor), 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid (minor), leucotylin (trace).

Etymology: This species is named in honour of my friend and colleague, the Australian lichenologist Dr Gintaras Kantvilas.

Notes:
Physcia kantvilasii is distinguished by the narrow, sublinear, convex lobes with ascending lobe apices, the sparse marginal cilia, the presence of terminal, labriform soralia, in having a K+ yellow medulla and in containing atranorin, zeorin, and the *speciosa* chemosyndrome of triterpenes. It is morphologically similar to some forms of *P. adscendens* H.Olivier and *P. tenella* (Scop.) DC., particularly in developing labriform soralia on the underside of the lobe tips. However, those species have a K– medulla and contain only atranorin. *Physcia kantvilasii* is also characterised by having convex lobes.

At present the new species is known only from the type locality. Associated lichens include *Hypotrachyna osseoalba* (Vain.) Y.S.Park & Hale, *Leioderma sorediatum* D.J.Galloway & P.M.Jørg., *Lepraria cupressicola* (Hue) J.R.Laundon, *Megalaria grossa* (Pers. ex Nyl.) Hafellner, *Pannaria leproloma* (Nyl.) P.M.Jørg., *P. microphyllizans* (Nyl.) P.M.Jørg., *Parmelia erumpens* Kurok., *Parmelinopsis horrescens* (Taylor) Elix & Hale, *Parmotrema crinitum* (Ach.) M.Choisy, *Pseudocyphellaria aurata* (Ach.) Vain. and *Usnea cornuta* Körb.

New records

Physcia erumpens Moberg, *Nordic J. Bot.* **6**, 856 (1986)
Physcia erumpens is characterized by convex lobes, laminal crateriform to capitate soralia, a brown-black to black lower surface (Moberg 1986) and the presence of atranorin, zeorin and the leucotylin chemosyndrome of triterpenes. It was previously known from East and South Africa, southern Europe, Macaronesia, North America, South America and New Zealand (Galloway & Moberg 2005; Moberg 1986, 1990, 1997, 2002).
Chemistry: Cortex and medulla K+ yellow, C–, P+ pale yellow; containing atranorin (major), zeorin (major), 16β-acetoxyhopane-6α,22-diol (major), 6α-acetoxyhopane-16β,22-diol (minor), 6α,16β-diacetoxyhopane-22-ol (minor), leucotylin (minor).

SPECIMENS EXAMINED
New South Wales: • South Coast, 1.5 km W of Surf Beach, Batehaven, 35°44′S, 150°13′E, 30 m, on *Acacia*, *J.A. Elix 1803*, 29.i.1976 (CANB); • North Coast, Park Beach, Coffs Harbour, 30°17′S, 153°07′E, 1 m, on trees in strand vegetation, *J.A. Elix 3419*, 29. vi.1977 (CANB); • North Coast, Old Macleay River estuary, Stuarts Point, 30°49′S, 153°00′E, 1 m, on *Aegericas corniculatum* in mangrove and strand vegetation, *J.A. Elix 21368, 21377*, 19.i.1987 (CANB); • Limeburners Creek Nature Reserve, Queens Head Area, 15 km S of Crescent Head, 31°19′09″S, 152°58′05″E, 5 m, on dead branch in coastal scrub with *Casuarina* and palms, *J.A. Elix 43582, 43590*, 7.viii.2008 (CANB).

Physcia krogiae Moberg, *Nordic J. Bot.* **6**, 858 (1986)
Physcia krogiae is characterized by the frosted-pruinose upper surface, particularly near the lobe apices, the laminal pustulate soralia, the brown to brown-black lower surface (Moberg 1986), and the presence of atranorin, zeorin and the *speciosa* chemosyndrome of triterpenes. It was previously known from East Africa and Central and South America (Moberg 1986, 1990).
Chemistry: Cortex and medulla K+ yellow, C–, P+ pale yellow; containing atranorin (major), zeorin (major), 6α-acetoxyhopane-16β,22-diol (major or minor), 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid (minor), 6α-acetoxy-22-hydroxyhopane-25-oic acid (trace), leucotylin (minor), ±16β-acetoxy-6α,22-dihydroxyhopane-25-oic acid (trace).

SPECIMENS EXAMINED
Northern Territory: • Umbrawarra Gorge, 22 km SW of Pine Creek, 13°59′S, 131°41′E, 220 m, on sandstone rocks in *Melaleuca*-dominated creek side, *J.A. Elix 22519 & H. Streimann*, 23.v.1991 (CANB, DNA), *J.A. Elix 28082, H.T. Lumbsch & H. Streimann*, 17.vii.1988 (B, CANB).
Queensland: • Kennedy North district, Hervey Range, 45 km SW of Townsville, 19°26′S, 146°24′E, 350 m, on granite rocks in dry sclerophyll forest, *J.A. Elix 20449 & H. Streimann*, 20.vi.1986 (CANB), *H. Streimann 37180*, 20.vi.1986 (CANB); • Expedition National Park, Robinson Gorge, 73 km NW of Taroom, 25°17′S, 149°09′E, 400 m, on sheltered rock crevice in steep gorge with palms and *Callistemon* shrubs, *J.A. Elix 35266*, 1.ix.1993 (CANB); • Cabbagetree Creek, 42 km ENE of Taroom, 25°29′S, 150°12′E, 240 m, on sandstone rocks in *Eucalyptus*-*Callitris*-dominated woodland, *J.A. Elix 35399*, 2.ix.1993 (CANB).

New South Wales: • South Coast, Buckenbowra River Estuary, 7.5 km W of Batemans Bay, 34°42′S, 150°06′E, 1 m, on trunk of *Avicennia* in mangrove swamp, *J. Johnston 2813*, 29.xi.1989 (CANB).
Australian Commonwealth Territory: • South Coast, Jervis Bay, Australian National Botanic Gardens Annex, 39°09′S, 150°40′E, on base of *Pisonia* branch in moist, rocky gorge, *D. Verdon 3102*, 9.ix.1977 (CANB).

Physcia rolfii Moberg, *Nordic J. Bot.* **10**, 337 (1990)
Physcia rolfii is characterized by narrow lobes with semicircular marginal soralia, the flat to convex, often distinctly white-maculate upper surface (Moberg 1990), and the presence of the *speciosa* chemosyndrome of triterpenes. It was previously known from Central and South America (Moberg 1990).
Chemistry: Cortex and medulla K+ yellow, C–, P+ pale yellow; containing atranorin (major), zeorin (major), 6α-acetoxyhopane-16β,22-diol (minor or trace), 6α-acetoxy-22-hydroxyhopane-25-oic acid (trace), 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid (trace), leucotylin (minor), ±16β-acetoxy-6α,22-dihydroxyhopane-25-oic acid (trace).

SPECIMENS EXAMINED
Queensland: • Kennedy North district, Red Falls**,** Lolworth Creek, 58 km WNW of Charters Towers, 19°55′S, 145°44′E, 330 m, on tree trunk on great basalt wall with scattered trees and shrubs, *J.A. Elix 20521 & H. Streimann*, 21.vi.1986 (CANB); • Burke district, Whitecliff Gorge Creek, Hann (The Lynd) Highway, 56 km NNE of Hughenden, 20°20′S, 144°24′E, 550 m, on weathered rocks in *Eucalyptus*-dominated woodland, *J.A. Elix 20745 & H. Streimann*, 26.vi.1986 (CANB).

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Figure 1. *Physcia dactylifera* (holotype in CANB). 1 mm

Figure 2. *Physcia kantvilasii* (holotype in CANB). 5 mm

Notes on the typification and citation of *Lobaria discolor* (Delise) Hue

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Abstract: The currently accepted typification of the palaeotropical lichen *Lobaria discolor* is shown to be incorrect, and should be typified on material collected by Bory de St-Vincent from Réunion in 1801. The correct citation of this taxon is *Lobaria discolor* (Delise) Hue, not *L. discolor* (Bory) Hue as is widely reported in the literature.

The palaeotropical lichen *Lobaria discolor* (Delise) Hue has a distribution from Madagascar to northern Queensland and eastern New South Wales in Australia (Elix 2001, McCarthy 2011), and material resembling the species was noted some years ago in the catchment of Kelly's Creek in Westland, New Zealand (unpublished observation). Since there is some confusion over both the typification and the correct citation of this species in the literature, the following notes are offered to clarify the situation.

Lobaria discolor was first collected by the French soldier-botanist Jean Baptiste Geneviève Marcellin Bory de St-Vincent (1778–1846) [cited hereafter as Bory]. Bory was born on 6 July, 1778, at Agen, France, and early developed a keen interest in natural history. He joined the French army in 1797, and in 1799 was chosen as one of the biologists to accompany the ships *Naturaliste* and *Géographe* under the command of Nicolas Baudin (1754–1803) on a long expedition to the southern oceans and Australia (Dunmore 1969, Kingston 2007). The expedition left France in November, 1800, visiting Madeira, the Canary Islands, and the Cape Verde Islands on the way to Mauritius in the Indian Ocean, which was reached in March, 1801. Bory had some differences of opinion with the other scientists and also with Baudin, and because he was also ill, he was left at Mauritius while the expedition went onwards to Australia. Bory recuperated there and made good use of his time in Mauritius and on nearby Réunion to make copious collections (including many lichens), observations, maps and drawings (he was a skilful artist and cartographer) of all that he saw. He returned to France in 1802 after a short stay on St Helena (Sauvageau 1908a, 1908b; Lacroix 1916; Galloway 1995). He was a prolific writer, and produced lively and detailed accounts of the Canary Islands (Bory de St-Vincent 1803) and of Mauritius and Réunion (Bory de St-Vincent 1804), illustrated with his own excellent drawings and maps. They are still good reading today. On this expedition he made fine lichen collections, and on his return to France those were carefully curated, and in many cases provided with names and Latin descriptions. They are preserved in the Thuret Herbarium (PC-THURET) in Paris (Biers 1924), and were examined by Dominic Delise (1780–1841). One of those Delise descriptions from Bory de St-Vincent material collected in Réunion is of *Sticta discolor* (Delise 1825), which is discussed further below.

Lobaria discolor (Delise) Hue, *Nouv. Arch. Mus. Hist. Nat*., sér. 4, **3**, 23 (1901).
≡ *Sticta discolor* Delise, *Mém. Soc. Linn. Calvados* [*Normandie*] **2**, 136, Tab. XVI, fig. 59 (1825) ["1822"].
≡ *Ricasolia discolor* (Delise) Nyl., *Mem. Soc. Imp. Nat. Cherbourg* **3**, 174 (1855).
Type: Îsle de Bourbon [Réunion], "sur les troncs d'arbres dans les grand bois", 1801, *J.B.G.M. Bory de St-Vincent* (?PC-Thuret; holotype – not seen)

Notes: In his typification of *Sticta discolor*, Yoshimura (1971: 263) cites a specimen collected in Réunion by "*Richard*" and held in Munich (M) as holotype, and gives Bory de St-Vincent as author of the name. That typification is incorrect on two counts.

(1) The citation of *Richard* as collector is in error, since Delise specifically mentions *Bory de St-Vincent* as having collected the species from the forests of Îsle de Bourbon (Réunion) in 1801, on which he (Delise) based his name (Delise 1825: 138). The Richard referred to by Yoshimura is most likely to have been *Jean Michel Claude Richard* (1784–1868), the French botanist and gardener who from 1830 was in charge of the botanical garden of Réunion (Stafleu & Cowan 1983: 764), not *Achille Richard* (1794–1852), the French botanist who published the Botany of Dumont D'Urville's *Astrolabe* voyage of 1826–1829 (Richard 1833), and a famous essay on the flora of New Zealand (Richard 1832). Although Achille Richard published a monograph on the orchids of Mauritius and Réunion (Richard 1828), there is no evidence that he collected lichens from there or from anywhere else (Lerond *et al*. 1987). It seems much more likely that the Munich "Richard" specimen designated by Yoshimura as holotype was collected by J.M.C. Richard, but it cannot be admitted as type material let alone designated as holotype since his collections would have been made three decades after Bory at least, and five years after Delise's publication! Since Bory's lichen herbarium (and it is extensive) is extant in Herbier Thuret in Paris in PC-THURET (Ahti 1980, 1993; Huovinen & Ahti 1986; Galloway & James 1986; Galloway 1995), it is there that the holotype should be sought, using Lenormand's alphabetical list of Delise's names that is found in Vol. 42 of Lenormand's lichen herbarium (unpublished observations) as a guide.

(2) Since Bory did not publish or even list *Lichen discolor* Bory in his account of the lichens of Réunion (Bory 1804), the description of *Sticta discolor* given by Delise (Delise 1825: 136) must be attributed to him as the publishing author, even though he lists as synonyms the unpublished herbarium names "*Sticta discolor* Bory, in herb. – *Lichen* (*pulmonarius*) *discolor* Bory. Voy." The correct citation of the lichen is thus *Lobaria discolor* (Delise) Hue, as given in Hue (1901), Swinscow & Krog (1988) and Krog (2000), not *Lobaria discolor* (Bory) Hue as given by Fée (1837), Zahlbruckner (1925), Yoshimura (1971), Elix (2001: 40), Wolseley *et al*. (2002) and McCarthy (2011). Further, the page number for Delise's citation of *Sticta discolor* given in Elix (loc. cit.) and in McCarthy (2011) should be p. 136, not p. 91 (that refers to Delise's description of *Sticta argyracea* Delise [= *Pseudocyphellaria argyracea* (Delise) Vain.], not to *Sticta discolor*).

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A new species of *Pertusaria* (lichenized Ascomycota, Pertusariaceae) from New Zealand

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Abstract: *Pertusaria southlandica* A.Knight, Elix & A.W.Archer *sp. nov.* is described from southern New Zealand.

Pertusaria is well-represented in the New Zealand lichen flora, with 53 species recorded (Galloway 2007), based on specimens collected from all parts of the country. In the course of a combined Wellington and Otago Botanical Society trip to western Fiordland (South Island), a new corticolous species was discovered and is described in this paper. The chemistry of the species was studied by thin-layer chromatography (Elix & Ernst-Russell 1993), high-performance liquid chromatography (Elix *et al.* 2003) and comparison with authentic samples.

Pertusaria southlandica A.Knight, Elix & A.W.Archer, sp. nov. Figs 1 and 2
Similis *Pertusaria thwaitesii* sed ostiolis pallidoribus et acidum conhypoprotocetraricum continens vice acidum protocetraricum.

Type: New Zealand, South Island: *Southland*: forest edge, Boyd Creek, 20 km W of Te Anau Downs, 45°08'S, 167°57'E, on fallen *Nothofagus solandri* twig, *A. Knight*, 6.1.2011 (OTA 60696 – holotype).

Thallus corticolous, pale grey-white, finely rimose-cracked, rough and thickish in fertile areas and against adjacent crusts, thinning towards margins. Surface dull to slightly shiny, lacking pruina, isidia and soredia. Faint black prothallus sometimes present. *Apothecia* verruciform, flattened-hemispherical, numerous, crowded, 2–3 mm diam., concolorous with the thallus. Thalline margins thick, smooth and slightly glossy. *Ostioles* pale, conspicuous, 3–8 per verruca, slightly sunken. *Ascospores* ellipsoid, hyaline, 2 per ascus, rough-walled, 87–105 × 30–50 µm.
Chemistry: cortex K–, KC–, C–, P+ yellow-orange, UV+ dull brick red; medulla UV+ bright white; containing conhypoprotocetraric acid (major), 2-chlorolichexanthone (minor), hypoprotocetraric acid (minor) and protocetraric aid (trace).

Etymology: the epithet is derived from Southland, the district in the South Island of New Zealand where the new species was found.

Remarks
Pertusaria southlandica is characterized by conspicuous, multi-ostiolate verrucae, asci with two rough-walled ascospores, and the presence of 2-chlorolichexanthone and conhypoprotocetraric acid. It somewhat resembles the coastal Australian *P. thwaitesii* Müll.Arg., which is also known from Sri Lanka and New Guinea (Müller 1884), but that species has longer ascospores (110–160(–175) µm *versus* 87–105 µm) and black ostioles, and contains protocetraric acid. The New Zealand endemic *P. vallicola* Elix

& Malcolm (Elix *et al*. 1995), known from one location in Canterbury, is also similar to *P. southlandica*; both species have asci with two rough-walled ascospores and pale ostioles, but *P. vallicola* contains hypoprotocetraric acid as a major compound and has smaller verrucae (0.2–0.3 mm *versus* 2–3 mm diam.) and only one ostiole per verruca.

At present, the new species is known from only the type locality, where associated *Pertusaria* species include *P. psoromica* A.W.Archer & Elix, *P. thamnolica* A.W.Archer, *P. truncata* Kremp. and *P. velata* (Turner) Nyl.

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Fig. 1. *Pertusaria southlandica* habit, thallus, and apothecia. 1 mm

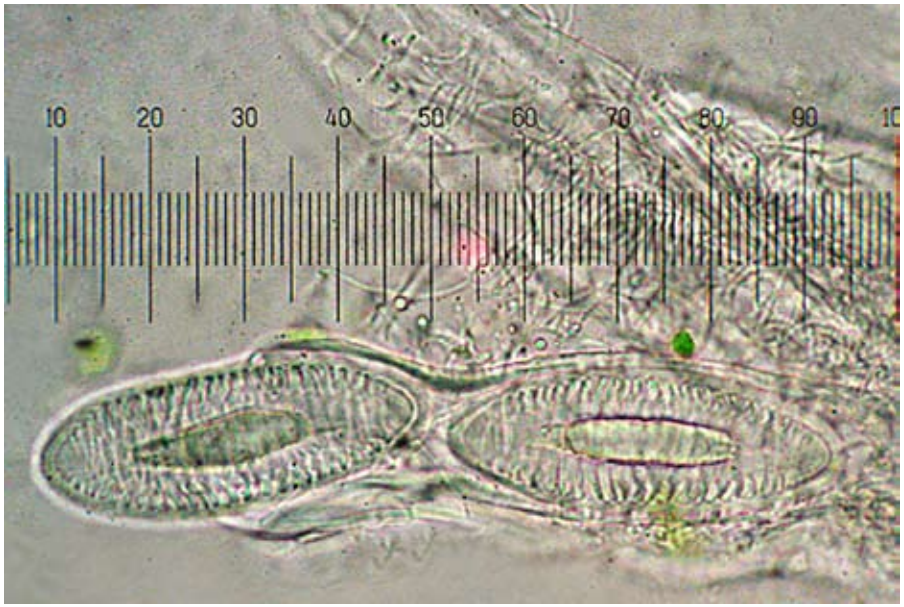

Fig. 2. *Pertusaria southlandica* ascospores in 10% KOH (1 division = 2.5 μm)

Aspects of Darwin: A New Zealand Celebration, edited by David Galloway and John Timmins. Published by The Friends of the Knox College Library, Dunedin, 2010. 180 pp., hardback. ISBN 978-0-473-17692-1. NZ$34.95 plus postage. Available from The Hewitson Library, Knox College, Arden St, Opoho, Dunedin 9010, New Zealand. The e-mail contact for ordering is <John.Timmins@knoxcollege.ac.nz>

This book is the outcome of a symposium held in September, 2009, in Dunedin, New Zealand, celebrating the life and scientific achievements of Charles Darwin, held on the bicentennial of his birth and the sesquicentennial of the publication of his *Origin of Species*. The book is a collection of essays based on presentations by notable New Zealand scholars from a wide range of disciplines. The focus is broad, delving into Darwin as the traveller, the thinker and the scientist, for Darwin's visit to New Zealand was very brief, spanning just the last few days of 1835.

The key chapter of interest to lichenologists is David Galloway's, entitled "Darwin's *Beagle* Lichens". David's penchant for weaving together history, natural history and systematics is well-known, and his past efforts in this regard have brought to life the contributions of many of the key historical figures in lichenology. This chapter is no exception. His account of his own early introduction to London's Natural History Museum and its treasures: "...crazily stacked, disintegrating cardboard boxes on rusting shelving..." prompted nostalgic recollections of my own early visits there. The chapter then deals briefly with the state of South American lichenology at the time of Darwin's visit, lists Darwin's collecting localities and specimens, and recalls some of Darwin's observations on the landscape and vegetation. Those include the first remarks about the fog-induced lichen oases in coastal Peru. David places Darwin firmly in the pantheon of South American lichenology, and sees him as the forerunner of such modern greats as Follmann and Imshaug.

I would heartily recommend this book to anyone interested in the history of science and natural philosophy in the traditional sense. In these times of whiz-bang methods, up-and-coming bright sparks, and the gradual fading away of old-fashioned scholarship, it is a pleasure to read a book where true penmanship is employed to stimulate, inform and entertain, very much in the way Darwin himself would have approved. The essays make wonderful reading, and give a very accessible insight into the life of one of the 19th century's greatest thinkers, a man who perhaps more than any other altered our view of the world and our perception of our place in it.

I enjoyed all the contributions, but the late Eric Godley's' "Reminiscences of a Neo-Darwinian" was a particular favourite. The book also caused me to reflect on the evolution of ideas themselves. In science, as elsewhere, it is vital to understand the origin of the axioms we cling to or the tenets that are all too quickly discarded as 'old hat', and to reflect how over time we gradually inch our way towards what we believe to be 'truth'.

Gintaras Kantvilas

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