Australasian Lichenology

Number 43, July 1998

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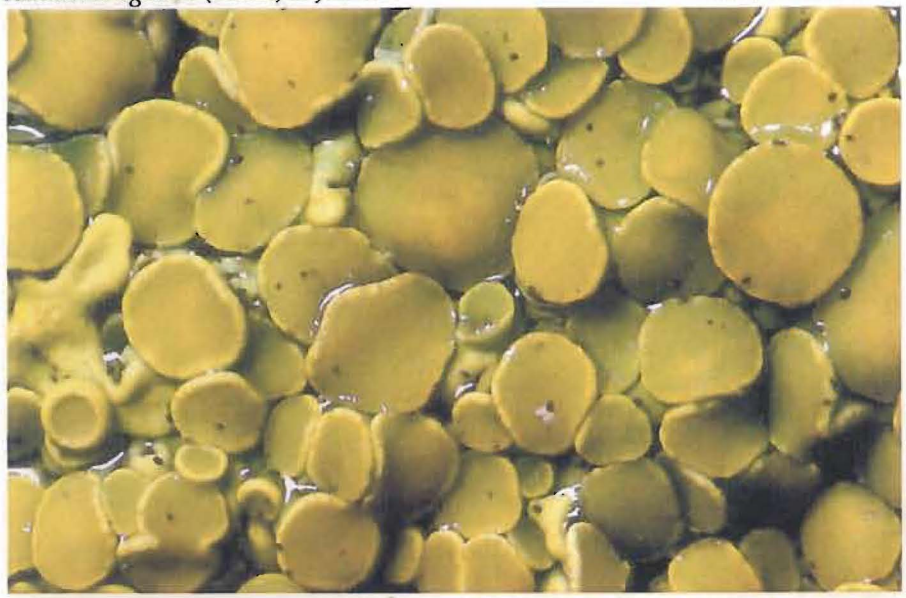
Australasian Lichenology

Number 43, July 1998

Xanthoria ligulata (Körb.) P. James 1 mm



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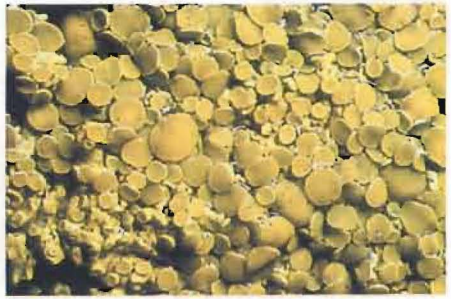

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ISSN 1328-4401 (formerly the *Australasian Lichenological Newsletter*)

Official publication of the Australasian Lichen Society

NATHAN SAMMY

It is with great sadness that we record the sudden death of Nathan Sammy (Department of Industries and Development, Darwin, Northern Territory, 0801), on 11 July 1998. Nathan became interested in lichens as a student in Malaysia in the early 1970s, and later as a graduate student in Perth he worked on the lichens (especially *Xanthoparmelia*) of Western Australia for his M.Sc. He was a keen collector of lichens from Western Australia, the Northern Territory, and northern Queensland, and also of Malaysia/Indonesia. In recent years, he has had a responsible conservation-based position in Darwin, acting as Science/Conservation Advisor to the Minister, and finishing a Ph.D. study on *Heterodermia* in the South Pacific, a project substantially complete at his death. We send our sincerest sympathy and thoughts to his wife Nola and family. A full Obituary will appear in the next issue of *Australasian Lichenology*.

David Galloway

ANNOUNCEMENT

Discussion and field meeting of Australasian lichenologists Dunedin, New Zealand, 15–19 November 1998

Venue: Botany Department of Otago University, Dunedin
Dates: Sunday to Thursday 15–19 November, 1998 — *please note change of dates.*
Cost: The cost of the meeting *without* accommodation is NZ$45 per person, which includes transport for the two field trips.
Accommodation and meals: A bed and a cooked breakfast in a University Hall of Residence costs NZ$36.50 per person per day—all of the rooms have only a single bed. Evening meals cost a further NZ$9.50 per person per day, and must be ordered in advance. Alternatively, you can request a list of other accommodation close to the University. A dinner is being arranged at a local restaurant for the evening of Wednesday the 18th—it will cost NZ$28.
Programme: The programme will include talks on a variety of topics including the history of lichenology in Otago, lichen products, lichen conservation, aquatic pyrenolichens, and foliicolous lichens. Offers of other talks or of displays would be very welcome.
Field trips: Two field trips are being arranged, one to Mount Cargill and Bethune's Gully, and the other to the Otago Peninsula. Species lists for Mount Cargill will be provided, and it is hoped that the list will be extended as a result of the field trip. Advice will be available for anybody who wishes to make other field trips in the area.
Registration: Please register as soon as possible because numbers might have to be limited. The full programme and a request for payment will be sent to the registered participants in September or October.

NAME (include title)

ADDRESS

PHONE

e-mail

Tick boxes as appropriate:

☐ I would like to stay in a University Hall of Residence.

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☐ I would like to attend the dinner on Wednesday the 18th.

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P.O. Box 56
DUNEDIN
fax: (03)–479–7583
e-mail: JMB@CLEAR.NET.NZ

Minutes of the 13th meeting of the Australasian Lichenologists, Coffs Harbour, 18–19 April 1998

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Present: Alan Archer, Pat Archer, Judith Curnow, David Eldridge, Jack Elix, Sharon Ford, Jim Gardner, Mary Gibson, Gintaras Kantvilas, Heino Lepp, Simone Louwhoff, Bronwen Myall, Gordon Myall, Kath Ralston, Nell Stevens, Neville Stevens, and Heinar Streimann.

Talks

After welcoming remarks from Professor Jack Elix (ANU) and Dr Gordon Myall (Coffs Harbour), the meeting began with a talk on Parmeliaceae of Lord Howe Island by Simone Louwhoff, followed by Kath Ralston searching for *Neuropogon acromelanus* on the Bogong High Plains, and Jack Elix tackling *Buellia* in Australia. Gintaras Kantvilas had taxonomic problems with *Siphula*, and David Eldridge showed us the soil crust lichens and mosses that survive at Maralinga in arid South Australia. Alan Archer tracked down some *Pertusaria* in P.N.G., and Nell Stevens gave a slide-show of some of her Australian *Usnea*.

The talks were informative and very interesting, as they dealt with a wide range of topics. Everyone wanted to go to Maralinga after David's slides showed how enchanting arid lands can look.

Discussion

The meeting considered how best to report new state (rather than new Australian) records of species. New Australian records appear regularly in *Australasian Lichenology*, and the meeting considered that new state records should also appear in this venue, albeit in a consolidated format. It is proposed to follow the procedure used for reporting new vice-county records in the *British Lichen Society Bulletin*, and Dr Patrick McCarthy (ABRS, GPO Box 636, Canberra, ACT 2601; FAX: (02)–6250–9448; E-mail: Patrick.McCarthy@ea.gov.au) has agreed to receive and consolidate state records for subsequent submission to Dr Bill Malcolm. Please note that the record should typically include the following information—locality, substratum, collector, collection number, herbarium, and who determined the specimen.

> e.g. *Buellia efflorescens* Müll. Arg.: on palm in an open situation, entrance to the Botanical Garden, Darwin, Northern Territory, 12°28'S, 130°51'E, *K. & A. Kalb 29475*, 26 Aug. 1995 (herb. Kalb). Determined: K. Kalb. New record for Northern Territory.

Next meeting

The next venue (2000) will be Melbourne, to be organized by Kath Ralston, Mary Gibson, and Sharon Ford in consultation with Jack Elix.

Association dinner

A banquet was organized for the association dinner, and held at the Dragon Chinese Restaurant, Coffs Harbour. Seventeen people attended, and an enjoyable meal and evening was had by all.

Sunday field trip

Sunday dawned sunny and cool for the field trip to several lichen sites chosen for us by Gordon and Bronwyn Myall. First stop mangroves at Red Rock, where everyone collected from terrestrial *Allocausuarina* sp. and forgot about collecting in the mud from mangroves. Next stop along Anderson's Hill Road was for rainforest lichens, followed by lunch in open sclerophyll forest and then a rewarding rainforest site at the base of the Waihou sandstone escarpment, where many interesting lichens were found. Mt Coramba was the final stop for the day, where we had an excellent view of the northern rivers region, and some good rock and soil bank lichens were found.

The whole weekend finished off with beer at a pub and a Vietnamese meal amidst much hilarity and chatter. Everyone voted it a great weekend.

Additional lichen records from New Zealand 28. *Buellia papillata* (Sommerf.) Tuck.

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On a recent visit to the old gold-mining site of Potters on the eastern slopes of the Old Man Range in Central Otago, a distinctive lichen was noticed overgrowing decaying tussocks, rabbit droppings, plant detritus, and dead bryophytes in a manner reminiscent of *Lecanora epibryon* ssp. *broccha*, and indeed the two taxa are sympatric in alpine grassland in this area. The lichen has a characteristic, widespreading, whitish, warty-papillate thallus, and produces numerous jet-black epruinose apothecia with a well-developed, black, slightly raised margin to the disc. Its spores are grey-brown to brown, 1-septate, to 25 µm long, and it has a distinctive thalline chemistry (cortex K+ dingy yellow, C+ orange, KC+ orange-red).

Thinking it to be a terricolous species of *Buellia* and possibly *B. insignis* (Hepp) Th.Fr., I sent it to John Sheard whose paper on *Buellia* of the British Isles (Sheard 1964) I still find a very useful work and full of important data. It was identified as the arctic-alpine taxon *Buellia papillata*, and as the lichen is new to New Zealand, and also only the third record from the Southern Hemisphere, we give a description of it below.

Buellia papillata (Sommerf.) Tuck., *Lichens of California*, 26 (1866).
Lecidea papillata Sommerf., *Suppl. Fl. Lappon.*, 154 (1826). *Abacina papillata* (Sommerf.) Norman, *Nyl. Mag. Naturvid.* **7**, 236 (1853). *Buellia insignis* var. *papillata* (Sommerf.) Th.Fr., *Nov. Acta Reg. Soc. Sci. Upsal.* ser. 3, **3**, 327 (1861). *Buellia parasema* var. *papillata* (Sommerf.) Th.Fr., *Lichenogr. Scand.* **1**, 591 (1874). *Buellia disciformis* var. *papillata* (Sommerf.) Vain., *Ark. för Bot.* **8** (4), 83 (1909). *Buelliopsis papillata* (Sommerf.) Fink, *Lich. Fl. United States*, 374 (1935). *Buellia subdisciformis* ssp. *nodulosa* Lynge, *Medd. om Grønland* **118** (8), 180 (1937). *Diplotomma papillata* (Sommerf.) C.W. Dodge, *Lich. Fl. Antarct. Continent* 347 (1973). For additional synonymy, see Imshaug (1951) and Lamb (1968).

Thallus crustose, irregularly spreading, 1.5–5(–10) cm diam., white, creamish white to greyish white, knobbly-verrucose-papillate, papillae densely congested to rather sparsely developed, prothallus not evident. Apothecia common, densely crowded to widely scattered, round to irregular, often distorted through mutual pressure, sessile, constricted at base, (0.1–)0.5–1.5(–2.5) mm diam.; disc black, matt, slightly sooty to subnitid, epruinose, subconcave at first, becoming plane to convex, occasionally with secondary apothecia or lobules developing on older, crowded discs; margins concolorous with disc, distinctly thickened and raised, persistent even in mature fruits. Excipulum of radiating cells, brownish to olive-black in section, 50–75 µm thick at sides continuous with hypothecium. Hypothecium dense brown-black. Epithecium granular, reddish brown to brown-black, 12–16 µm thick. Thecium hyaline to very pale straw yellow, 80–90(–100) µm tall, paraphyses densely conglutinate, septate, 1.4–1.8 µm diam., apices swollen, to 2.5 µm diam. Ascospores ellipsoid, brown to grey-brown, 1-septate, thin-walled, slightly constricted at septum, apices pointed, contents often ± vacuolate, (13.5–) 15–21.5 (–25) × 5–6.5(–7.5) µm.

Chemistry: Thallus K+ dingy yellow, C+ orange, KC+ orange-red; containing atranorin (minor) and 6-*O*-methylarthothelin (major) by TLC and HPLC.

Habitat: *Buellia papillata* grows over dead grass, decaying moss, plant detritus, old rabbit droppings on soil in inter-tussock spaces, and alongside small water channels in old mined surfaces. In the site at Potters (1200 m), it is a common and obvious lichen, forming spreading colonies to 10 cm diam., and instantly recognized by its granular-papillate thallus (10× handlens) and frequent coal-black, lecideine apothecia. Sterile thalli could be mistaken for *Brigantiaea fuscolutea* and even *Lepraria incana*, but the thallus chemistry discriminates *Buellia papillata* from these superficially similar and often sympatric taxa. It is undoubtedly more widespread, and should be looked for in the high-alpine grasslands and fellfields of the Central Otago mountains and elsewhere in South Island. It associates with the following lichens: *Arthrorhaphis citrinella, Bellemerea alpina, Brigantiaea fuscolutea, Cladonia* spp., *Lecanora epibryon* ssp. *broccha, Lecidella* cf. *euphorea, Lepraria incana, Leproloma vouauxii, Leptogium victorianum, Micarea* spp., *Omphalina alpina, Peltigera dolichorhiza, Placopsis parellina, P. trachyderma, Psoroma hirsutulum, P. palaeceaum, Pseudocyphellaria degelii, Rinodina conradii, Sticta martinii,* and *Trapelia coarctata.*

Distribution: *Buellia papillata* is an additional bipolar species (Galloway & Aptroot 1995) in the New Zealand mycobiota. It is widely distributed in arctic-alpine habitats in the Northern Hemisphere, where it is known from central and northern Europe (Poelt 1974; Nimis 1993; Türk & Poelt 1993); Scandinavia (Degelius 1945; Santesson 1993); West Greenland (Lynge 1937); Novaya Zemlya (Lynge 1928); arctic Asia (Andreev *et al.* 1996); and arctic and alpine North America (Tuckermann 1866; Fink 1935; Thomson *et al.* 1969; Thomson 1969, 1970, 1972; Thomson & Scotter 1983, 1984, 1985; Nobel *et al.* 1987; Vitt *et al.* 1988; Thomson & Ahti 1994). It has been recorded from the Himalaya (Awasthi 1963), and a single record exists from James Ross Island off the NE coast of Graham Land in Antarctica (Lamb 1968; Dodge 1973). Two recent records (1986) are from King George Island (Fildes Peninsula, Station "Bellingshausen") in the South Shetlands (Prof. M. Andreev, *pers. comm.*). It is not recorded from Australia (Filson 1996) or Chile (Galloway & Quilhot 1998).

We are grateful to Prof. Mikhail Andreev (St Petersburg) for providing information on recent collections of *Buellia papillata* from the Southern Hemisphere.

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Additional lichen records from Australia 35. *Porina nigrofusca* Müll. Arg.

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Porina nigrofusca Müll. Arg., *Flora* **66**, 332 (1883).

The crustose thallus is pale to medium greyish green, rimose to areolate and moderately thick. The perithecia are semi-immersed and have a thick, dimidiate involucrellum that is outwardly convex and black, but internally orange-brown or greyish brown; it does not enclose algae. The 3-septate ascospores are 18–24 × 3.5–5 µm.

Porina nigrofusca was previously known from damp and aquatic siliceous rocks in São Paulo State, southern Brazil, and apart from this report, appears not to have been collected since the 1880s. The lichen has an unusually thick thallus and, even more remarkably, its colour can vary from pale to quite dark greenish grey. For a fuller description and illustration, see McCarthy (1993).

SPECIMEN EXAMINED
Queensland, McIlwraith Range, 27 km NE of Coen, track to old Leo Creek mine, 13°43'S, 143°19'E, alt. 400 m, on semi-exposed boulder on moderate slope in monsoon forest, *H. Streimann 56815*, 17.x.1995 (CANB).

Reference
McCarthy, PM (1993): Saxicolous species of *Porina* Müll. Arg. (Trichotheliaceae) in the Southern Hemisphere. *Bibliotheca Lichenologica* **52**, 1–134.

Additional lichen records from Australia 36. *Frutidella*, new to Australia and the Southern Hemisphere

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The genus *Frutidella* was recently erected to accommodate the species previously known as *Lecidea caesioatra* Schaer. (Kalb 1994). This taxon clearly differs from *Lecidea sensu stricto* as it is currently understood (Hafellner 1984: 298), in particular by its ascus type and habitat. The ascus is not of the typical *Lecidea*-type, but is reminiscent of *Lecidella*, while the thallus grows over cushions of the moss genera *Andreaea* and *Grimmia* on siliceous rocks in alpine situations, but the lichen does not grow directly on rock. Kalb (1994) includes the genus in the family Biatoraceae. The thallus of *Frutidella caesioatra* (Schaer.) Kalb consists of tiny, off-white to pale brown, corticate granules, c. 0.1 mm wide, which are often densely packed to form a compact thallus. The apothecia are markedly convex from an early stage, and black with a faint but characteristic blue-grey pruina. Previously this species was known from arctic-alpine habitats in Europe and North America.

Among unidentified lichen dupicates sent to Berlin from the Australian National Herbarium (CANB) was a specimen which clearly belongs to this species, namely: leg. *J.A. Elix 40509 & H. Streimann*, 18 February 1994, Victoria, Mt McKay, Alpine National Park, 16 km SSE of Mount Beauty, 36°52'S, 147°14'E (B, CANB). Here *F. caesioatra* was found at an elevation of 1840 m on a granitic outcrop in an exposed subalpine grassland. It was overgrowing dying moss of the genus *Andreaea*. The dominant associated lichen was *Lepraria neglecta* (Nyl.) Erichsen s.l., which has a similar granular habit, but the granules are whiter and lack a cortex. This choice of habitat matches perfectly with that observed in Europe.

Thin-layer and high-performance liquid chromatographic analysis (Elix *et al.* 1997) of this specimen revealed the presence of sphaerophorin (major), thiophanic acid (minor) and atranorin (minor). Kalb (1994) reported the presence of sphaerophorin in this species. A detailed description is given in Kalb (1994) and Purvis *et al.* (1992).

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Methyl pseudoalectoronate, a new depsidone from the lichen *Parmotrema poolii*

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Abstract: The new depsidone methyl pseudoalectoronate (3) has been detected in extracts of *Parmotrema poolii* together with alectoronic acid (1), α-collatolic acid (2), 4-*O*-methylphysodic acid (4), and the cortical depsides atranorin and chloroatranorin.

Alectoronic acid (1) and α-collatolic acid (2) are common orcinol depsidones, widely distributed in many lichen genera (Huneck & Yoshimura 1996). In an earlier structural study of these compounds, we confirmed that they exhibit rapid equilibrium between the keto-acid and lactol tautomers (1a ↔ 1b; 2a ↔ 2b) (Elix *et al.* 1974). A number of minor metabolites which co-occur with alectoronic acid (1) and α-collatolic acid (2) in various species have yet to be identified. In this paper, we describe the natural occurrence of methyl pseudoalectoronate (alectoronic acid methyl pseudo-ester) (3) together with (1), (2), 4-*O*-methylphysodic acid (4), atranorin, and chloroatranorin in extracts of *Parmotrema poolii* (C.W. Dodge) Krog & Swinscow.

Materials and Methods

Authentic (synthetic) material of the methyl pseudoalectoronate (3) was obtained by treatment of alectoronic acid (1) with methanol containing a catalytic amount of concentrated sulfuric acid (Elix *et al.* 1974).

Chromatography. Natural compounds were characterized by thin-layer chromatography (TLC) according to the methods standardized for lichen products (Culberson 1972; Elix & Ernst-Russell 1993), and by high-performance liquid chromatography (HPLC) with retention index values (R_I) calculated from benzoic acid and solorinic acid controls (Elix *et al.* 1997; Feige *et al.* 1993). The HPLC was coupled to a photodiode array detector for ultraviolet spectroscopic comparisons. By this means, the ultraviolet spectra observed for the various components eluting in the HPLC chromatogram were recorded and computer-matched against a library of ultraviolet spectra recorded for authentic metabolites under identical conditions. For each new substance, the correlation of ultraviolet spectra of the synthetic and natural material was greater than 99.9%.

Methyl pseudoalectoronate (3) exhibited standard TLC R_F values: R_F (A) 0.54; R_F (B) 0.35; R_F (C) 0.38; R_F (E) 0.31. Standard HPLC: R_T 28.5 min.; R_I 0.33.

Lichen material

Australia. •Queensland, Gillies Highway, 5.9 km from foot of Range, 300 m, 5 Nov. 1965, *S. Kurokawa 5603* (CANB); Wild River, Herberton, 17°23'S, 145°23'E, 880 m, 1 July 1984, *J.A. Elix 16999 & H. Streimann* (CANB). •New South Wales, Currowan State Forest, 12 km W of Nelligen, 120 m, 7 July 1977, *J.A. Elix 3603* (CANB); Bobo Forest, 30°14'S, 152°50'E, 1991, *B. & G. Myall* (CANB).

Papua New Guinea. •Morobe Province, Kebi, 5 km W of Bulolo, 7°13'S, 146°42'E, 850 m, 28 May 1982, *H. Streimann 19786* (CANB); Heads Hump, 5 km E of Bulolo, 7°11'S, 146°41'E, 800 m, 16 July 1982, *H. Streimann 22401* (CANB); Mt Susu, 3 km SW of Bulolo, 7°13'S, 146°36'E, 1000 m, 24 Oct. 1982, *H. Streimann 25473* (CANB).

Discussion and results

The natural occurrence of methyl pseudoalectoronate (3) in the extracts of *Parmotrema poolii* has now been confirmed. Comparisons were conducted between the synthetic ester (3) and the total acetone extracts of *P. poolii* by TLC in four independent solvent systems and by HPLC coupled to a photodiode array detector for ultraviolet spectroscopic comparisons. The HPLC of such an extract is shown in Fig. 1. By these means, *P. poolii* was shown to contain atranorin (minor), chloroatranorin (minor), alectoronic acid (major), α-collatolic acid (2) (major), methyl pseudoalectoronate (3) (minor/trace), 4-*O*-methylphysodic acid (4) (minor/trace), and unknowns (minor/trace).

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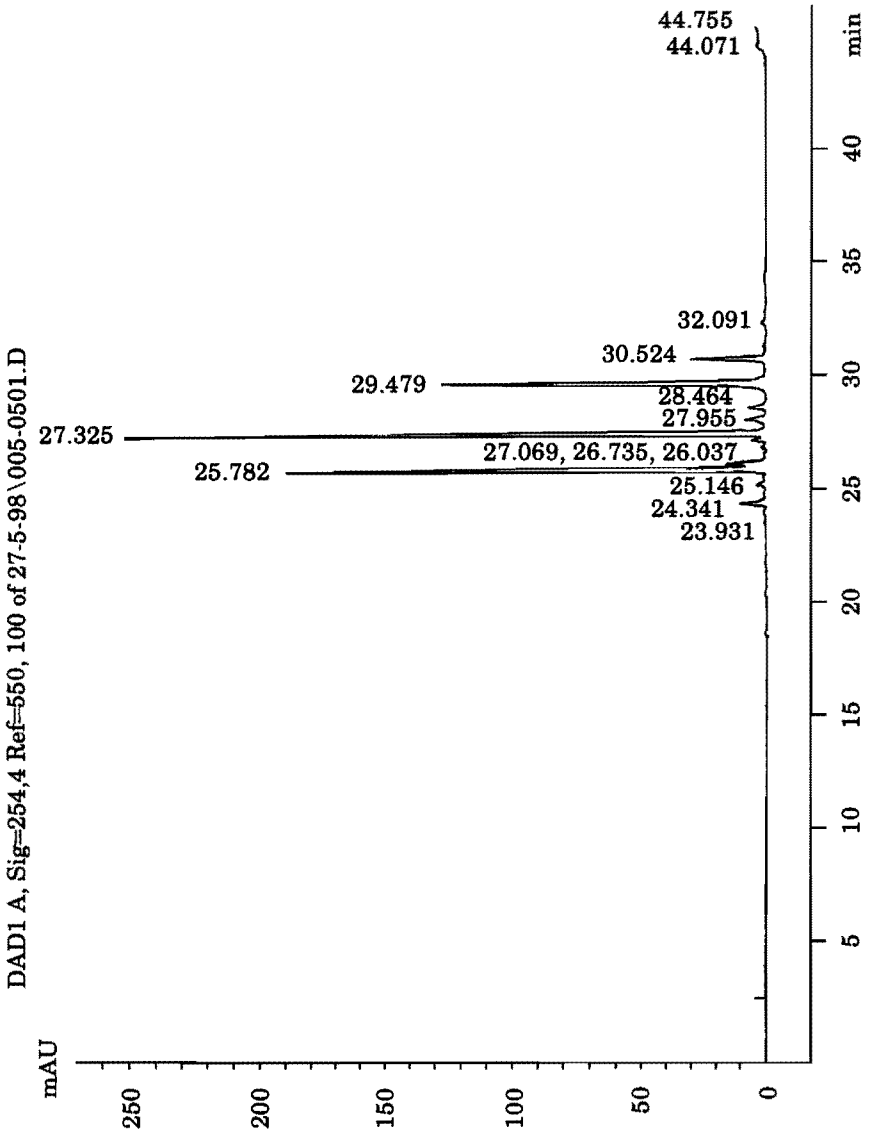
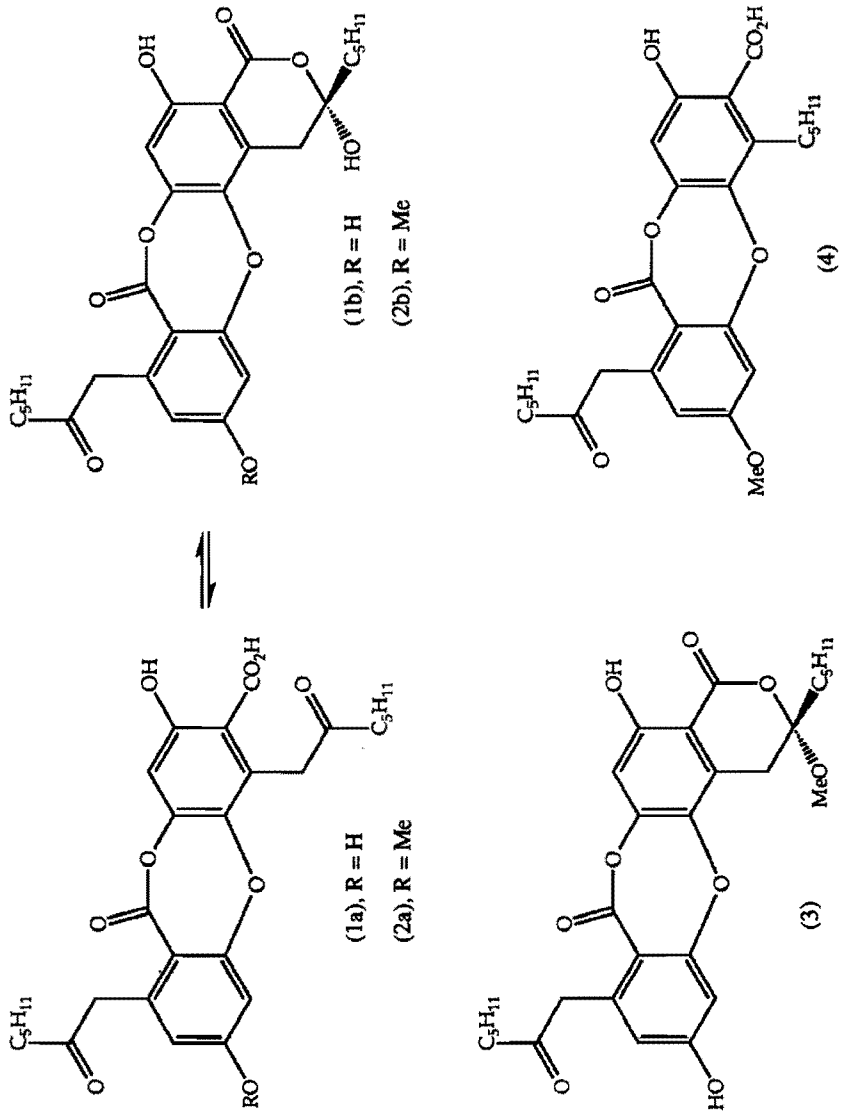


Fig. 1. HPLC of acetone extract of *Parmotrema poolii* (*Streimann 25473*). R_T 24.341 = unknown; R_T 25.782 = alectoronic acid; R_T 26.037 = unknown; R_T 27.069 = unknown; R_T 27.325 = α-collatolic acid; R_T 27.955 = 4-*O*-methylphysodic acid; R_T 28.464 = methyl pseudoalectoronate; R_T 29.479 = atranorin; R_T 30.524 = chloroatranorin.



Graphis elixii, a new Australian species containing psoromic acid

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Abstract: The new species *Graphis elixii*, containing psoromic acid, is described from Australia.

Graphis elixii A.W. Archer, sp. nov. (Graphidaceae). Fig. 1A

Sicut *Graphis albonitens* Müll. Arg. sed lirellis sessilis et acidum psoromicum continens.

Type: AUSTRALIA, New South Wales: Monga State Forest, along the Mongarlowe River, 5 km S of Monga, 35°37'S, 149°55'E, alt. 665 m, in rainforest on canopy of *Eucryphia moorei, J.A. Elix 11732*, 25.i.1984, holotype: CANB.

Thallus pale fawn, thin, corticolous; surface smooth and shiny. Apothecia lirelliform, conspicuous, scattered, sessile, straight or slightly curved, unbranched, black; lips initially closed then opening to form a slit, with a conspicuous thalline margin; lirellae 1–2 mm long, 0.3–0.4 mm wide. Proper exciple laterally carbonized; hymenium hyaline, ca. 100 µm tall. Ascospores hyaline, rounded-oblong, 8 per ascus, 2-seriate, (16–)18–20 µm long, 8–10 µm wide, 4-locular.

Chemistry: K–, KC–, C–, Pd+ yellow; psoromic acid.

Graphis elixii is characterized by the conspicuous lirellae, the small 4-locular ascospores, and in particular the presence of psoromic acid. Psoromic acid is a very rare compound in the Graphidaceae (Wirth & Hale 1978), and is known from only two species, *Graphina columbina* (Tuck.) M. Wirth & Hale (Wirth & Hale 1978) and *Graphis alboscripta* Coppins & P. James (Coppins *et al.* 1992). Neither of these two species has carbonized exciples, and in the *Graphina* species the ascospores are both transversely and longitudinally septate. *Graphis alboscripta* occurs in the high-rainfall areas of western Scotland, and appears to be endemic to that region.

The new species described above resembles *Graphis albonitens* Müll. Arg., Fig. 1B, described from a specimen from Bellenden Ker, Queensland (Müller 1891). Both of these species have laterally carbonized proper exciples and small 4-locular ascospores, but in *G. albonitens* the lirellae are immersed in the thallus and are barely visible as a thin black line. In contrast, the lirellae in *G. elixii* are conspicuous and sessile, with thick thalline margins. Lichen compounds are absent from *G. albonitens* whereas *G. elixii* contains psoromic acid.

The new species is named after Professor J.A. Elix, Australian National University, who collected the specimen and who has contributed greatly to the chemotaxonomy of Australian lichens. *Graphis elixii* is so far known from only the type specimen.

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Figure 1. Diagrammatic cross-sections of lirellae.
A: *Graphis elixii* A.W. Archer, **B**: *Graphis albonitens* Müll. Arg.

Some observations on the genus *Ramalina* in Otago and Southland, NZ

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Abstract The first fertile New Zealand collection of *Ramalina unilateralis* is reported, and the first collection of *R. canariensis* from the South Island. The distributions of seven other species of *Ramalina* in Otago and Southland are discussed.

After reading the paper by Blanchon *et al.* (1996) on *Ramalina* in New Zealand, I decided to examine the distribution of *Ramalina* in Otago and Southland. I started by using the distribution maps in Blanchon *et al.*'s paper, specimens in OTA, my own collections, and some collection records from Peter Johnson. It soon became obvious that more detailed searches were necessary, and so I looked for *Ramalina* in a variety of areas.

One interesting pattern is the apparent absence of *Ramalina* in Fiordland. The distribution maps show none at all, and no specimens are lodged in OTA. My own searches during visits to Puysegur Point and areas in Dusky Sound, Caswell Sound, and George Sound failed to find any specimens. The maps appear to be correct, and Fiordland does appear to be a *Ramalina* desert. I did not find any *Ramalina* in the Port Pegasus area of Stewart Island either, although *R. celastri* is recorded by Blanchon *et al.* (1996) in the north of Stewart Island, and several species are recorded from the Invercargill area of Southland.

Sixteen species of *Ramalina* are found in New Zealand. Of those, eight have been recorded in Otago and Southland: *R. celastri, R. erumpens, R. fimbriata, R. glaucescens, R. inflexa, R. peruviana, R. riparia,* and *R. unilateralis*. At a coastal site near Dunedin, I found a further species, *R. canariensis*, growing on totara twigs. This is the first time the species has been recorded in the South Island, although it has been recorded in the North Island as far south as Barryville. Stevens (1987) shows the latitudinal distribution of the Australian taxa, and it is interesting to note how much further south the distribution has been extended by the Otago and Southland collections—R. *canariensis* from 40° to 45°S, *R. celastri* from 41° to 47°S, *R. fimbriata* from 42° to 46°S, *R. glaucescens* from 43° to 47°S, *R. peruviana* from 36° to 45°S, and *R. unilateralis* from 43° to 47°S.

R. celastri, R. glaucescens, and *R. inflexa* are considered to be widespread in the South Island, and were common in the sites visited. Of approximately 60 sites where species of *Ramalina* were found, *R. celastri* occurred in 82%, *R. glaucescens* in 55%, and *R. inflexa* in 50%. *R. inflexa* occurs mainly near the coast. *R. erumpens, R. fimbriata, R. riparia,* and *R. unilateralis* are said to be restricted in their distribution, with only *R. unilateralis* being recorded outside Otago and Southland. *R. peruviana* has been collected once in Otago, by J.S. Thomson in 1933 in the Silver Peaks area. That specimen is in CHR. The species has not been collected since, and no collections of it are lodged in OTA.

R. erumpens is rare, and was found at only five sites. *R. erumpens* var. *norstictica* is restricted to the Otago Peninsula. I have found it there on *Coprosma* at a new site, Sandymount, and it has been found at the same site on rock, even though it is usually corticolous.

Blanchon *et al.* (1996) describe *R. fimbriata* as rare and growing on rock at 1200–1600 m, mostly under overhanging schist ledges. It is rare, but does not appear to be restricted to high altitudes. It has been collected in Otago from basalt cliffs at Black Head at 150 m, from a basalt cliff face on the Otago Peninsula at 15 m, and from a vertical schist face at Nenthorn at 420 m.

Previously *R. riparia* had been found at only Taieri Mouth, Akatore, and Wangaloa Hill. Although it is still uncommon, I have found it again at those sites and at some new sites as well. Its range has now been extended to Tiwai Point near Invercargill, the Catlins, and Carey's Creek north of Dunedin. At some sites it grows in profusion, its thalli often covering twigs of both native and introduced trees. It ranges from sea level to 180 m, and does not appear to be restricted to riverine sites.

R. unilateralis appears to be widespread but sparse. I have found it at 45% of my sites, but usually only one or a few specimens at each. Many of the thalli are small, and so they can easily be overlooked. One collection was from the canopy of a wind-felled kanuka (*Kunzia ericoides*). The species is perhaps more common in canopies, although it generally grows at lower light intensities than other *Ramalina* species do. In Australia, Stevens (1987) notes that it ordinarily is corticolous but becomes saxicolous at lower latitudes, e.g. Macquarie Island (55°S). Blanchon *et al.* (1996) state that it tends to be common on rock and dead wood in exposed upland and subalpine areas, but so far I have found it growing on only trees or shrubs, even though three saxicolous specimens from Otago are lodged in OTA. It grows on both native and introduced trees and shrubs, often but not always on dead twigs, from sea level to 400 m. One collection from Douglas Fir twigs at the edge of a plantation in Beaumont Forest (altitude 60 m) was fertile, and another fertile thallus was found in Carey's Creek (altitude 20 m). Blanchon *et al.* (1996) note that apothecia have not been found in New Zealand material of *R. unilateralis*, and Stevens (1987) records them as being rare in Australia.

I hope to take this study further by producing distribution maps for the species of *Ramalina* in Otago and Southland, a long-term project considering the large size of that area. At the same time, it might be possible to determine some of the ecological conditions which underlie the distributions.

Acknowledgments
I am grateful to Peter Johnson for making available his collection records for *Ramalina*, to David Galloway for checking the identifications, and to Peter Bannister for help with transport.

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Contributions to a history of New Zealand lichenology
1. Cook's botanists.

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Introduction

In 1753 Linnaeus published *Species Plantarum*, a work which is used as the starting point for valid publication of lichen names and which contains short diagnoses of 89 taxa recognized as lichens, the majority (80) being included in the collective genus *Lichen* which Linnaeus classifed in the Algae. Of that number, only five are based on extra-European material, the remainder being from northern Europe (Jørgensen e*t al.* 1994). Linnaeus had scant interest in lichens, regarding them as the "rustici pauperrimi"—the poor little peasants—of nature, his restricted view of the group holding back study of lichens for several decades (Galloway 1981b, Jørgensen *et al.* 1994). Fifteen years later, when Cook's first expedition sailed away from Britain, virtually nothing at all was known of the lichens of the Southern Hemisphere. Cook's three great circumnavigations—the 1768–1771 voyage of the E*ndeavour* (Beaglehole 1955); the 1772–1775 voyage of the *Resolution* and *Adventure* (Beaglehole 1961); and the 1776–1780 voyage of the *Resolution* and *Discovery* (Beaglehole 1967)—in their totality garnered an amazing collection of natural history objects (including lichens), many of which still remain to be worked out in detail (e.g. Carter *et al.* 1981). With so much new to be discovered in all plant and animal groups at that time, it is not surprising that lichens received only marginal attention—yet they were not entirely overlooked, and all three voyages brought back lichens from New Zealand and elsewhere. Almost every lichen collected was new to science, but it was not until many years later that names would be available for most of the collections, and it was to be 30–45 years before Linnaeus's last student, Erik Acharius (1757–1819) would publish a first "lichen system" and a world view of lichenology (Acharius 1803, 1810 & 1814, Galloway 1981a).

Banks & Solander

Cook surveyed the New Zealand coast from 7 October 1769 until 31 March 1770. Over the course of those 174 days, the *Endeavour* was at anchor for 55 days, and on 44 days the botanists Banks and Solander were ashore (Beaglehole 1955, Godley 1965). Their collection of c. 360 species was the first ever made of New Zealand plants (Godley 1965, 1983).

In recent years, Joseph Banks (1743–1820) and Daniel Solander (1736–1782) have attracted considerable attention from biographers (Rauschenberg 1968, Lysaght 1971, Carter 1988, Duyker & Tingbrand 1995, Duyker 1998), and their collections and papers have received scholarly scrutiny (see for example Lysaght 1979 & 1981, Carter *et al.* 1981, Diment & Wheeler 1984).

Banks was early on interested in cryptogams (including lichens) through his friendship with the Rev. John Lightfoot (1735–1788), and they exchanged enthusiastic letters on plants, mosses, lichens, and fungi. In a letter to Banks written on 27 February 1766 and preserved in the Dawson Turner transcripts in the Botany Department Library (BM), Lightfoot writes the following "...Dear Sir...When Pythagoras discovered his golden Proposition he is said to have run about the streets like a Madman, crying out in Extasies ["Eureka, eureka"]: I had like to have done the same, when I open'd your Letter and saw *Banks* at the bottom of it... I sincerely thank you for the Specimens you have been so kind as to send me. The Hyp. riparium is entirely new to me... At my own Parish of Sholden near Alton in Hampshire... I found great plenty of Lich. articulatus [*Usnea articulata*], and some few small specimens of L. vulpinus [*Letharia vulpina*, not now known to occur in Britain!]. These I think are most of ye Acquisitions I have made since I had the pleasure of seeing you last... Among several rare ones he has sent one new Species not mentioned in Hudson [William Hudson's *Flora Anglica*, C. Moran, London (1762), Lichens pp. 441–463]. It is the Lich. aphthosus Lin. [= *Peltigera aphthosa*, but as this species does not occur in Britain, it was probably *P. britannica* that was under discussion] as Solander informs me. I hope you'll come and see and partake of my Collection what you want" (Dawson 1958).

Later in 1766 (May until October), Banks and his friend Constantine Phipps visited Newfoundland and Labrador on the 32-gun frigate *H.M.S. Niger*, and in his diary of that journey (Lysaght 1971), he makes several references to lichens which show him to be already well acquainted with the group, and he brought back to London 16 taxa in 11 genera (Lysaght 1971: 313). Banks bought at auction a bound volume of the original illustrations to Dillenius's *Historia Muscorum* (a work that Linnaeus relied on heavily in preparing his account of lichens for *Species Plantarum*), so contemporary (and earlier) lichen publications were in his library.

Solander, as a student and friend of Linnaeus (Jonsell 1994, Duyker 1998), would have been perfectly *au fait* with the accepted classification of lichens at that time. His knowledge of the Linnaean system, and Banks's interest and enthusiasm for all plant groups, including cryptogams, meant that lichens were not overlooked on their various *Endeavour* landfalls. Indeed, they took with them on the *Endeavour* a copy of the second (1763) edition of *Species Plantarum*, and in the pages of vol. II (pp. 1375–1684) [the copy is held in the Botany Department Library at the Natural History Museum in London], they made notes and descriptions of the lichens that they collected at the Cape of Good Hope, Brazil, Tierra del Fuego, Tahiti, St Helena, and Madeira (unpublished observations). Solander's notes on the lichens collected are also found in the Slip Catalogue held in the Botany Department Library of the Natural History Museum in London (Marshall 1978, Diment & Wheeler 1984).

Although Banks & Solander's contributions to New Zealand and Pacific botany are well known (Merrill 1954, Groves 1962, Godley 1965 & 1983, Stearn 1969 & 1978, Edwards 1978, Fosberg 1993), their lichen collections have never been documented. I found Banks and Solander's New Zealand lichen collections in a box in a tower storeroom at the Natural History Museum in 1973, amongst a large accumulation of unincorporated material. The lichens are pasted onto cards and have a printed label at the top—"Banks & Solander in Cook's First Voyage, New Zealand, Aug. 1769". This is in error, for as indicated above, the first New Zealand landfall was not until October 7, 1769. Several specimens also have a pencil annotation in Solander's hand (Marshall 1978), generally of the form "Lichen 6 nova" (Galloway 1997: 106, fig. 1). All are obviously from northern coastal habitats as evidenced by the presence of *Parmotrema cristiferum, Pseudocyphellaria carpoloma*, and *Ramalina geniculata*. The *Endeavour* lichens are as follows:

Cladia aggregata ["Lichen 2 nova"]
Parmotrema cristiferum
Pseudocyphellaria carpoloma
Pseudocyphellaria coronata
Pseudocyphellaria crocata ["Lichen 4 nova"—*Lichen crocatus* L. (the basionym of *P. crocata*) was not published until 1771 in Linnaeus's *Mantissa* (p. 310), and was based on a specimen from India collected by Koenig (Galloway & James 1980: 295)]
Pseudocyphellaria dissimilis ["Lichen 5 nova"]
Ramalina geniculata

Rimelia reticulata ["Lichen perlatus Linn."]
Stereocaulon ramulosum ["Lichen 3 nova"—Lichen ramulosus Sw. The basionym of *S. ramulosum* was not published until 1788, when Swartz described it from a Jamaican collection (Galloway 1980: 271)]
Sticta latifrons ["Lichen 6 nova"—*Sticta latifrons* was described by Richard in 1832 from a Nelson collection (Galloway 1997: 109, fig. 5)]

J.R. & J.G.A. Forster and Anders Sparrman

Johann Reinhold Forster (1729–1798) and his son Johann George Adam Forster (1754–1795), generally known as George Forster, botanists on Cook's second voyage, have an established place in the annals of South Pacific botany (Stearn 1978, Edwards 1978, Hoare 1981 & 1982, Fosberg 1993), and it is for their descriptions of phanerogams that they are best remembered today. However, they did not totally neglect cryptogams. George Forster listed five lichens in the Appendix of his book *Florulae Insularum Prodromus* (Forster 1786), assigning them roman numerals and not names. This is scarcely surprising, for at that time very few lichens from the Southern Hemisphere were represented in European herbaria. Those that were had come from the earlier collections of Philibert Commerson from Fuegia (Galloway 1985b) or Banks & Solander from New Zealand and Tahiti, and none was named, although Commerson appended unpublished descriptive names on the slips accompanying some of his collections. George Forster described his first and only lichen from a Fuegian collection, an epiphyte of the shrub *Berberis ilicifolia*, and to it he gave the name *Lichen berberinus* (Forster 1789), the first lichen to be described from South America, and known these days as *Pseudocyphellaria berberina* (Galloway & James 1977). Two of their New Zealand lichen collections were named by Swartz (1781) in his doctor's thesis, which was defended on 14 April, 1781, in the presence of his supervisor Carl Linnaeus the younger.

The Swedish botanist Anders Sparrman (1748–1820) joined the *Resolution* at Capetown, engaged by the elder Forster at his own expense to help George Forster with the botany of the voyage. Sparrman, a pupil of Linnaeus as was Solander on the *Endeavour* voyage, was young and fit (he was 24 when he joined the *Resolution*), and besides helping to collect plants was able to write descriptions of them while George Forster made drawings and water-colours of both botanical and zoological specimens (Du Rietz 1981). At the end of the voyage, the Forsters "...according to their promise, had allowed him a fair share of the zoological, botanical, and ethnological collections from the voyage with Cook" (Du Rietz 1981: 82), and this material is now to be found in various Swedish museums. Sparrman's private papers, correspondence, field notes, and journals disappeared after his death, and are apparently lost forever (Du Rietz 1981). He published his own account of the *Resolution* voyage, and in it he paints a lively picture of the forest at Dusky Sound, where he botanized widely and even ascended above bushline on occasion "...The trees in this wood, growing on their fallen ancestors which had rotted through the centuries and been transformed into the richest mould, reached gigantic heights; no sunbeam could ever penetrate their denseness to evaporate the mists and clouds drawn and driven down from the neighbouring mountain range almost daily by rain. Here ferns flourish, *Algae* [by which he meant Lichens, since in the Linnean system, lichens were classified as Algae], and other small creeping things, and parasites as thickly as plants in a hot-bed..." (Sparrman 1953).

Forster lichen material taken by Sparrman to Uppsala is housed in the Thunberg Herbarium, and from this material Olof Swartz (1781) described two new lichens, the first to be described from the Southern Hemisphere and both from the South Island of New Zealand: *Lichen linearis* Sw. [= *Ramalina celastri* (Spreng.) Krog & Swinscow—see Stevens (1983) for difficulties surrounding the use of the name *Ramalina linearis*] and *Lichen filix* Sw. [= *Sticta filix* (Sw.) Nyl.]. The *Ramalina* would have been collected from Queen Charlotte Sound (it is apparently not present anywhere in Fiordland, and certainly not in Dusky Sound), and from Dusky Sound *Pseudocyphellaria faveolata*, *Sticta filix*, and *S. latifrons* are known in Forster collections held in London (BM), Uppsala (UPS-THUNBERG), and Swartz's herbarium (S, SBT) in Stockholm (Galloway 1981). Swartz's paper has a life-size engraving of the Dusky Sound specimen of *Sticta filix*, a curious stalked lichen reminiscent of a small fern, a resemblance Swartz underlined in his choice of specific epithet. The lichen was subsequently illustrated in colour engravings in Hoffmann (1801) and Delise (1825). Thus it is from George Forster, both directly and indirectly (*via* Anders Sparrman and Olof Swartz), that the printed record in Southern Hemisphere lichenology derives. Two other lichens, *Pseudocyphellaria coronata* and *Stereocaulon ramulosum*, collected from "Dusky Bay" are also present in BM, the first attributed to "Mr Andrews", the second to "Captain Cook".

An additional Forster specimen from New Zealand held in the Uppsala herbarium (UPS-THUNBERG 26348) was described by Acharius (1810: 619) as *Usnea cornicularia*, and is a species of *Ramalina* closely similar to *R. australiensis* (Galloway 1985a: 501).

William Anderson

William Anderson (1750–1778) was the second son of Robert Anderson, a respected schoolmaster of North Berwick in Scotland. He studied medicine at Edinburgh from 1766 to 1769, where he was taught by Alexander Monro (Secundus), and passed the examinations of the Royal College of Surgeons (London) in 1768 and 1770 (Lysaght 1959 & 1981, Beaglehole 1967). He sailed twice with Cook, firstly as surgeon's chief mate on the second circumnavigation (1772–1775), where he no doubt benefited considerably from working with the Forsters and Anders Sparrman. A collection of *Sticta filix* made by Willam Anderson is in the herbarium of the Natural History Museum in London (BM), its provenance given as "Dusky Bay 1773". Anderson kept a journal during the second voyage, which he took on Cook's third voyage "...I have made several remarks on this place [Queen Charlotte Sound] & its inhabitants as well as many others in a Manuscript I have by me intitled The General History of a voyage made in the Resolution in the years 1772, 1773, 1774 and 1775." (Beaglehole 1967: 797). Sadly, this manuscript journal has never been traced (Lysaght 1959 & 1981). It may well have contained interesting observations on the plants and lichens he collected in Dusky Sound and elsewhere.

Anderson was appointed chief surgeon and naturalist on Cook's third (1776–1780) voyage, from which he (like Cook himself) did not return. The *Resolution* and *Discovery* anchored in Queen Charlotte Sound in 12 February 1777 and sailed from there on 26 February, and during that only New Zealand landfall, Anderson spent several days on shore collecting and making delightfully observant notes on the botany, geology, and zoology of the area, as his journal shows (Beaglehole 1967: 796–818). Earlier in the voyage, he noted in Kerguelen that "...A very beautiful branch'd species of Lichen grows on the rocks higher up than the other vegetable productions.", a reference to *Neuropogon taylori*, a remarkable species endemic to that island (Walker 1985). He failed to mention lichens again in his journal, noting only of the cryptogams in Queen Charlotte Sound "...There is several sorts of Mosses either rare or only produced here, besides a great number of other plants whose uses are not yet known and only subjects fit for Botanical books..." (Beaglehole 1967: 805).

Thus, from Cook's three voyages the following lichens are known: *Cladia aggregata, Parmotrema cristiferum, Pseudocyphellaria carpoloma, P. coronata, P. crocata, P. dissimilis, P. faveolata, Ramalina celastri, R. geniculata, Rimelia reticulata, Stereocaulon ramulosum, Sticta filix,* and *S. latifrons*, and these constitute the base on which New Zealand lichenology is founded.

Acknowledgments

I am grateful to Mr Robert Ross, Mr John Cannon, and Dr Steve Blackmore, successive Keepers of Botany in the Department of Botany, the Natural History Museum, London, for the opportunity to study early collections of New Zealand lichens held in the Museum's herbarium collections, and to the late Dr Averil Lysaght (London) for fruitful discussions on the collections of Sir Joseph Banks.

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