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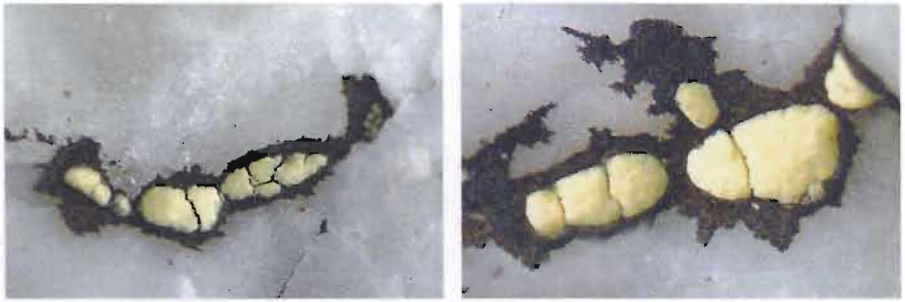

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Because it's both distinctive and cosmopolitan, *Rhizocarpon geographicum* is among the world's most familiar crustose lichens. It's largely restricted to acidic granitic or siliceous rocks, mostly at high elevation and latitude, and is seen here growing on a quartz pebble. It's commonly called the "map lichen" because its growth form of sharply angled mosaics outlined with coal-black prothalli resembles a miniature map. That growth form inspired Linnaeus in 1753 to give it the epithet *geographicus* in his newly authored genus *Lichen*. It gets its distinctive yellow-green colour from the pigment rhizocarpic acid. Tolerant of high winds, substrata with high metal concentrations, and moderate air pollution, it's also the species of choice for dating surfaces such as historic monuments and glacial moraines.

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Fusarubin from a lichen source

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Abstract: The naphthazarin fusarubin has been shown to be the major red pigment present in the medulla of the lichen *Xanthoparmelia endomiltoides*.

The so-called endomiltoides "anthraquinones" (Hale 1990) are a family of related red or violet pigments found in the medulla of several South African species of *Neofuscelia, Paraparmelia* and *Xanthoparmelia*. Although the presence of these striking pigments has been accepted as a primary species character, the compound(s) responsible have not been separated from lichen sources, nor have their chemical structures been elucidated. We have now shown that the major pigment present in *Xanthoparmelia endomiltoides* (Nyl.) Hale is the naphthazarin fusarubin (1), first isolated from the pathogenic fungus *Fusarium javanicum* Koor. (Arnstein *et al.* 1946) and *F. solani* (Mart.) Sacc. (Ruelius & Gauhe 1950). In this paper we describe the natural occurrence of fusarubin (1) in the lichen *Xanthoparmelia endomiltoides* (Nyl.) Hale.

Materials and methods

Authentic material of fusarubin (1) was supplied by Dr Russell A. Barrow and was obtained by extraction of an unidentified *Fusarium* species. The lichen-derived fusarubin (1) was characterized by thin-layer chromatography (TLC), high performance liquid chromatography (HPLC), mass spectrometry and ultraviolet spectroscopy (see below). The low resolution electron-impact mass spectrum was measured on a VG AutoSpec mass spectrometer operating at 70 eV.

Chromatography

The lichen pigment (1) was characterized by thin-layer chromatography according to the methods standardized for lichen products (Culberson 1972, Elix & Ernst-Russell 1993), and by high-performance liquid chromatography with retention index values (R_I) calculated from benzoic acid and solorinic acid controls (Elix & Wardlaw 2000, 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. In the present case, the correlation of ultraviolet spectra of the authentic pigment (1) with that of the lichen metabolite was greater than 99.9%.

Fusarubin (1) exhibited standard TLC R_F values: R_F (A) 0.36; R_F (B) 0.09; R_F (C) 0.28. Standard HPLC: R_T 18.9 min.; R_I 0.11. Mass spectrum *m/z* 306 (M, 15%), 288 (M-H_2O, 100), 273 (65), 259 (15), 246 (70), 245 (38), 217 (15).

Lichen material

Xanthoparmelia endomiltoides (Nyl.) Hale
Republic of South Africa. *Cape Province*: •5 km S of Uniondale Poort, Holdrif River valley, Grid ref. 3323 CA, 830 m, on quartzite, *F. Brusse 4773*, 2.iii.1986 (CANB); •26.4 km E of Ladismith on Hwy. R62, Grid ref. 3321 AD, on conglomerate boulders and ledges, *M.E. Hale 73147*, 2.ii.1986 (CANB); •Huisrivier Pass, 1 km E of Ladismith-Calitzdorp road, 1 km E of crossing to Bergplaas, 33°28'S, 21°32'E, 600 m, *D. Triebel & G. Rambold 7832, 7833*, 30.iii.1990 (M).

Discussion and results

The natural occurrence of fusarubin (1) in the extracts of the lichen *Xanthoparmelia endomiltoides* has now been confirmed. Comparisons were conducted between the authentic pigment (1) and the total acetone extracts of the above lichens by TLC in three independent solvent systems and by HPLC coupled to a photodiode array detector for ultraviolet spectroscopic comparisons. In addition to the red pigment (1), *X. endomiltoides* contains minor quantities of the related purple pigments anhydrofusarubin lactol and anhydrofusarubin lactol methyl ketal (Elix & Wardlaw 2001) together with usnic acid (minor or trace), salazinic acid (major) and consalazinic acid (minor).

Acknowledgement

We thank Dr Russell A. Barrow of the Department of Chemistry, The Faculties, Australian National University, for a generous sample of authentic fusarubin and 8-*O*-methylfusarubin.

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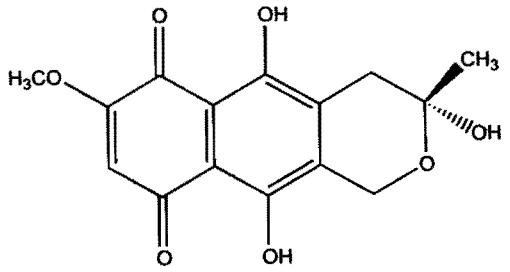
(1)



A new depsidone from the lichen family Parmeliaceae

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Abstract: The new depsidone 6α,9α-di-*O*-methylsalazinic acid has been detected in the lichens *Cetreliopsis rhytidocarpa, Hypotrachyna quaesita* and *Xanthoparmelia subnuda*.

The lichen family Parmeliaceae is well known for its chemical diversity, and has proved a rich source of lichen substances, particularly of depsides and depsidones (Elix 1994). In a continuation of our chemotaxonomic investigations of this family, we have recently encountered the new lichen metabolite 6α,9α-di-*O*-methylsalazinic acid (4) together with its congenors salazinic acid (1), 9α-*O*-methylsalazinic acid (2) and quaesitic acid (3).

Materials and methods

Authentic material of the *O*-methyl derivatives (2) and (4) was obtained in the following manner. 9α-*O*-methylsalazinic acid (2) was obtained as described by Asahma and Tukamoto (1934). Standard TLC R_F values: R_F (A) 0.30; R_F (B') 0.19; R_F (C) 0.18; R_F (G) 0.42. Standard HPLC: R_T 17.9 min.; R_I 0.19.

6α,9α-di-*O*-methylsalazinic acid (4) was prepared by treating a methanolic solution of salazinic acid (0.1 mmol) with *N,N*-dicyclohexylcarbodiimide (0.15 mmol). After filtration of the precipitated dicyclohexylurea, concentration of the solution afforded a mixture of products. These were subsequently separated by preparative layer chromatography over silica gel using 15% acetic acid-toluene as eluant. Two fast moving bands developed. The higher R_F band yielded 6α,9α-di-*O*-methylsalazinic acid (4) (5.3 mg, 14%) while the second band contained methyl pseudosalazinate (Elix *et al.* 1997). 6α,9α-di-*O*-methylsalazinic acid (4) crystallized from ethyl acetate as colourless microcrystals, m.p. 240° dec. (Found: mol. wt. 416.0744. $C_{20}H_{16}O_{10}$ requires mol. wt. 416.0743). ^1H n.m.r. ($CDCl_3$) δ 2.49, s, ArMe; 3.45, 3.60, 2s, OMe; 4.71, s, CH_2; 6.43, s, CHOMe; 6.73, s, H2; 8.41, bs, 8-OH; 10.40, s, CHO; 12.90, s, 3-OH. Mass spectrum *m/z* 416 (M, 12%), 385 (16), 384 (60), 370 (21), 369 (100), 325 (13), 299 (11), 177 (20). TLC R_F values: R_F (A) 0.48; R_F (B') 0.24; R_F (C) 0.40; R_F (G) 0.51. Standard HPLC: R_T 20.1 min.; R_I 0.27.

Extraction of *Xanthoparmelia subnuda* (Kurok.) Hale

The lichen *Xanthoparmelia subnuda* was collected on sheltered granite rocks at Gudgenby River Gorge, 4.5 km S of Tharwa, A.C.T., Australia, *J.A. Elix 32658A, Lui, X-W. & P. Bernado*, 6.ix.2001 (CANB), where it occurred together with *Flavoparmelia haysomii*. The dried lichen thallus (80 g) was extracted in a Soxhlet extractor sequentially for 48 h with 1L of light petroleum, anhydrous diethyl ether and anhydrous acetone. Analytical high performance liquid chromatography (h.p.l.c.) indicated that the unknown compound was present in the acetone extract. After concentration of this extract to 100 mL, the solid was filtered and the filtrate was purified by preparative-layer chromatography over silica gel using 15% acetic acid / toluene as eluant. The major bands were extracted into acetone in turn and concentrated. The fourth band yielded 6α,9α-di-*O*-methylsalazinic acid (4) (10.5 mg), the composition of which was confirmed by comparison with synthetic material (t.l.c., h.p.l.c. and ultraviolet spectroscopy).

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 (Feige *et al.* 1993). For TLC, standard R_F values were determined in four independent t.l.c. solvent systems: (A) toluene / dioxan / acetic acid (180:45:5); (B) hexane / t-butyl methyl ether / formic acid (140:72:18); (C) toluene / acetic acid (170:30); (G) toluene / ethyl acetate / formic acid (139:83:8). For HPLC a Hewlett Packard HP 1050 Series System, a Phenomenex Hypersil 5C18 column (250 by 4.6 mm) and a spectrometric detector operating at 254 nm with a flow rate of 1 mL/min were used. Two solvent systems were used: 1% aqueous orthophosphoric acid and methanol in the ratio 7:3 (A) and methanol (B). The run started with 100% A and was raised to 58% B within 15 min, then to 100% B within a further 15 min, followed by isocratic elution in 100% B for a further 10 min. 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. In the present case, the correlation of ultraviolet spectra of the synthetic depsidone (4) with that of the lichen metabolite was greater than 99.9%.

Lichen Material

Cetreliopsis rhytidocarpa (Mont. & v.d. Bosch) Lai subsp. *rhytidocarpa*
Papua New Guinea. *Central Province:* •near Efogi, grid ref. EK 7487, 1700 m, on fallen branch in *Lithocarpus* forest, *P.W. Lambley 1435*, 4.xii.1987 (CANB). *Milne Bay Province:* •Bonenau, Mt Mon, grid ref. GK 5909, 2000 m, on branch in *Castanopsis* forest, *P.W. Lambley 732*, 15.xi.1986 (CANB).
Philippines. Mindanao, *Cotabato Province:* •Lake Venado, Mt Apo, 7°00'N, 125°16'E, 2200 m, on branch in tropical rainforest, *F. Schumm 6110 & U. Schwartz*, 10.viii.1999 (CANB).

Hypotrachyna quaesita (Kurok.) DePriest & B. Hale
Papua New Guinea. *Central Province:* •Mt Albert-Edward, en route from the Woitape Airstrip to the summit of Mt Albert-Edward, 2500 m, *H. Kashiwadani 11542*, 23.i.1974 (TNS); •Mt Albert Edward, en route from tent site to summit area, 3000 m, *S. Kurokawa 9391*, 24.x.1975 (TNS—holotype). *Eastern Highlands Province:* •Mt Gahavisuka Provincial Park, 11 km N of Goroka, 6°01'S, 145°25'E, *H. Sipman 22178*, 7.iii.1987 (B). *Morobe Province:* •Mt Kaindi, 5 km W of Wau, 7°21'S, 146°41'E, 2300 m, *H. Streimann 33165*, 9.i.1983 (CANB). *Southern Highlands Province:* •Onim Forestry Station, Iaro River, 14 km NNW of Ialibu, 6°09'S, 143°57'E, 2280 m, *J.A. Elix 13453b & H. Streimann*, 19.xii.1982 (CANB).

Discussion and Results

We have now detected the co-occurrence of the depsidones (1)–(4) in both *Cetreliopsis rhytidocarpa* and *Hypotrachyna quaesita*. Although the compounds (1), (2) and (3) (Asahina & Tukamoto 1934, Huneck & Yoshimura 1996) are known lichen metabolites, 6α,9α-di-*O*-methylsalazinic acid (4) has not hitherto been recorded as occurring in nature. Minor quantities of the latter compound were also extracted from *Xanthoparmelia subnuda*, where it co-occurs with norstictic acid (major), salazinic acid (major), connorstictic acid (trace) and consalazinic acid (trace). Comparisons were conducted between the synthetic ester (4) and the total acetone

extracts from the various species by TLC in four independent solvent systems and HPLC coupled to a photodiode array detector for ultraviolet spectroscopic comparisons. With the extracts obtained from *Cetreliopsis rhytidocarpa* and *Hypotrachyna quaesita*, it is possible that the *O*-methyl derivatives (2) and (4) of salazinic acid are artifacts derived by methanolysis of quaesitic acid (3) during the analytical procedures, but this is certainly not the case with *Xanthoparmelia subnuda*.

Acknowledgements
We thank the curators of B, CANB and TNS for the loan of lichen specimens and the Australian Research Council for their financial support of this work.

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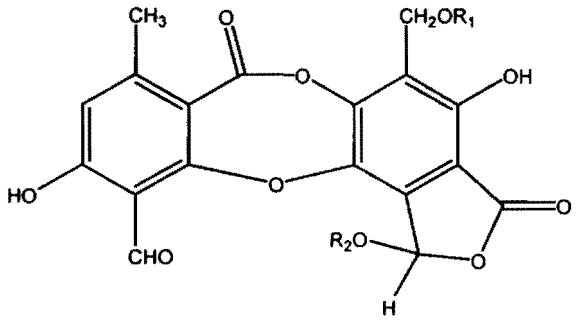
(1) $R_1 = R_2 = H$

(2) $R_1 = CH_3$; $R_2 = H$

(3) $R_1 = COCH{=}CHCO_2H$; $R_2 = H$

(4) $R_1 = R_2 = CH_3$



Chemical Variation of the Lichen *Neofuscelia pulla* (Ascomycotina: Parmeliaceae) *sensu* Esslinger

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Abstract: The secondary chemistry and geographic distribution of *Neofuscelia pulla sensu* Esslinger has been investigated. Three distinctive taxa, *N. perrugosa*, *N. pulla* and *N. subprolixa*, have now been delimited, and the new combination *Neofuscelia perrugosa* (Nyl.) Elix is made.

Species of the lichen genus *Neofuscelia* (Parmeliaceae) show remarkable morphological plasticity, but are more or less consistent in their production of lichen substances (Esslinger 1977). *Neofuscelia pulla* (Ach.) Essl. in particular is renowned for its wide spectrum of morphological variation. Thalli of this species may vary from being large, foliose, loosely adnate and subpulvinate, to tightly adnate and almost subcrustose. Similarly, the lobes may vary from being thick, broad and subrotund to thin, narrow and sublinear-elongate and the upper surface from smooth to markedly rugose, and from pale tan to almost black (Esslinger 1977). Esslinger concluded that "the (morphological) intergradation is too complete to allow recognition of segregate taxa". Although ten more or less morphologically similar species (the *N. pulla* group) were segregated on the basis of their secondary chemistry, all species containing stenosporic and divaricatic acid were retained in *N. pulla*. A reinvestigation of the chemical variation of the *N. pulla sens. lat.* is reported in the present paper.

Materials and Methods

Chromatography. The secondary chemistry of the lichen material was 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) (Elix & Wardlaw 2000, Feige *et al.* 1993).

Lichen Material (selected specimens examined)

Neofuscelia perrugata (Nyl.) Elix (total 39)
France: •Corsica, Corse du Sud, Punta de la Parata, W of Ajaccio, *H. Kammerer, H. Mayrhofer & E. Unger*, 5.xi.1993 (GZU). **Georgia**: •Caucasus, Mckheta district, Dzhvari, 550–600 m, *V. Vasák*, 7.vii.1982 (GZU). **Tunisia**: •Les Chênes, 7 km S of Draham, 730–760 m, *J. Poelt 5880*, 11.iv.1968 (GZU). **Turkey**: •Diyarbakir, Egil Village between Diyarbakir and Ergani, *H. Pölzl*, 1989 (GZU).

Neofuscelia pulla (Ach.) Essl. (total 86)
Australia: *Australian Capital Territory*: •Gudgenby River Gorge, 4.5 km S of Tharwa, 35°34'S, 149°04'E, 620 m, *J.A. Elix 10906*, 10.iv.1983 (*Lichenes Australasici Exs.* No. 40, CANB, GZU). **New Zealand**: *South Island*: •Otago, Queenstown Hill, Queenstown, 700 m, *J.A. Elix 7566*, 4.iii.1980 (CANB). **Italy**: *Tuscany Archipelago*: •Elba Island, east Elba, Innamorata, S of Pareti, *H. Mayrhofer 8707 & J. Sattler*, 26.xi.1989 (GZU). **Spain**: *Canary Islands*: •Gran Canaria, road between Fontanale and Pinos de Galdar, c. 8 km W of Teror, 28°03'N, 15°37'W, 1400 m, *F. Schumm 5325 & U. Schwarz*, 28.xii.1998 (CANB, herb. Schumm).

Neofuscelia subprolixa (Nyl.) Elix (total 201)
Australia: *New South Wales*: •Jimberoo State Forest, 11 km NNE of Rankins Springs, 33°45'S, 146°19'E, 340 m, *J.A. Elix 25328*, 13.vi.1990 (CANB). **New Zealand**: *South Island*: •Canterbury, Lees Valley road, 7 km N of Oxford, 460 m, *J.A. Elix 8300*, 28.v.1980 (CANB). **Republic of South Africa**: *Cape Province*: •Devil's Peak portion of Table Mountain, above University of Capetown, 33°35'S, 19°09'E, 600 m, *T.H. Nash 23571*, 22.i.1986 (CANB).

Discussion and Results
Esslinger (1977) recognized only one species for the *Neofuscelia pulla* complex because "of the nearly complete sympatry of the stenosporic acid and divaricatic acid races, and the close chemical similarity of the two compounds". The present, more detailed, chemical study of *N. pulla sensu* Esslinger using more sensitive analytical procedures (HPLC) has now shown that this is definitely not so. In marked contrast to the observed intergradation of the morphotypes, three distinct "chemotypes" not only maintain chemical integrity throughout their geographic distribution, but two are allopatric. As a consequence, three species are now recognized (Elix 1982). The only chemical variability observed relates to the accessory substances gyrophoric and lecanoric acids, atranorin and the scabrosin derivatives. These compounds show typical accessory occurrence—that is, they occur sporadically in addition to the constant constituents, and show no correlation with any morphological or distributional variations (Elix 1982). Gyrophoric acid and accompanying lecanoric acid commonly occur in both *N. pulla sens. str.* and *N. perrugosa*, while the scabrosin derivatives occur rarely in *N. subprolixa*. Traces of atranorin occur sporadically in all three species.

Neofuscelia pulla (Nyl.) Essl., *Mycotaxon* **7**: 52 (1978)
≡ *Parmelia pulla* Ach., *Syn. Meth. Lich.* 206 (1814). Type: Sweden, coll. unknown [lectotype: H-ACH *fide* T.L. Esslinger & T. Ahti, *Revista Fac. Ci. Univ. Lisboa, Sér. 2, C, Ci. Nat.* **17**: 635 (1975)].
= *Parmelia olivacea* var. *prolixa* Ach., *Methodus* 214 (1803); *Parmelia prolixa* (Ach.) Carroll, *J. Bot.* **3**: 288 (1865). Type: Sweden, coll. unknown (lectotype: H-ACH *fide* T.L. Esslinger & T. Ahti, *loc. cit.*).
= *Parmelia locarnensis* Zopf ex Rosend., *Nova Acta Abh. Kaiserl. Leop.-Carol. Deut. Akad. Naturf.* **87**: 436 (1907). Type: Switzerland, Ticino, im unteren Thale der Maggia bei Locarno am Lago Magiore, *Zopf*, 1900, in Arnold, *Lich. Exs.* 1816 (isotype: H-NYL).

Neofuscelia pulla sensu stricto invariably contains stenosporic acid (major), divaricatic acid (minor), perlatolic acid (minor or trace), 4-*O*-demethylstenosporic acid (trace) and oxostenosporic acid (trace) in the medulla throughout its entire range of distribution (Figure 1). In addition, this species may contain gyrophoric acid (major, minor or absent), lecanoric acid (minor, trace or absent), and atranorin (trace or absent). *Neofuscelia pulla* is widespread in temperate Europe, Asia Minor, North Africa, Canary Islands, Australia and New Zealand.

Neofuscelia perrugata (Nyl.) Elix, comb. nov.
Basionym: *Parmelia perrugata* Nyl., *Flora* **68**: 295 (1885). Type: France, Pyrénées-Orientales, Améelie, *W. Nylander*, 1884 [lectotype!: H-NYL *fide* T.L. Esslinger, *J. Hattori Bot. Lab.* **42**: 135 (1977)].
= *Parmelia prolixa* var. *exasperans* Nyl., *Flora* **58**: 8 (1875); *Parmelia exasperans* (Nyl.) Gyeln., *Repert. Spec. Nov. Regni Veg.* **30**: 221 (1932). Type: Russia, Hogland (Suursaari), *M. Brenner*, 1873 (holotype!: H-NYL).

Neofuscelia perrugata contains divaricatic acid (major), stenosporic acid (minor), and oxostenosporic acid (minor) in the medulla together with gyrophoric acid (major, minor or absent), lecanoric acid (minor, trace or absent) and atranorin (trace or absent) (Figures 2, 3). *Neofuscelia perrugata* appears to be restricted to the Northern Hemisphere, occurring in temperate northern, central and southern Europe, Asia Minor and North Africa.

Neofuscelia subprolixa (Nyl. ex Kremp.) Elix, *Mycotaxon* **71**: 455 (1999)
≡ *Parmelia subprolixa* Nyl. ex Kremp., *Verh. K. K. Zool.-Bot. Ges. Wien* **30**: 337 (1880); *Parmelia imitatrix* var. *subprolixa* (Nyl. ex Kremp.) Müll. Arg., *Flora* **66**: 47 (1883); *Parmelia prolixa* var. *subprolixa* (Nyl. ex Kremp.) Zahlbr., *Cat. Lich. Univ.* **6**: 107 (1929). Type: Australia, Victoria, Mitchell River, *F.J.H. von Mueller s.n.* [lectotype!: ZT *fide* T.L. Esslinger, *J. Hattori Bot. Lab.* **42**: 135 (1977)].

Neofuscelia subprolixa contains divaricatic acid (major), stenosporic acid (trace), and nordivaricatic acid (trace) in the medulla, and very rarely accessory scabrosin 4,4'-dibutanoate, scabrosin 4-acetate-4'-hexanoate and scabrosin 4-acetate-4'-butanoate (minor, trace or absent) or atranorin (trace or absent) (Figure 4). The presence of gyrophoric acid has not been observed in this species. *Neofuscelia subprolixa* appears to be restricted to the Southern Hemisphere, being widespread in South Africa (Esslinger 2000), Australia and New Zealand.

It is interesting that the two species containing divaricatic acid as a major constituent (but distinguished by the minor, invariant *para*-depsides) are completely allopatric.

Acknowledgements
I thank Dr Walter Obermayer (GZU) and Dr Orvo Vitikainen (H) for the generous loan of critical type and herbarium material.

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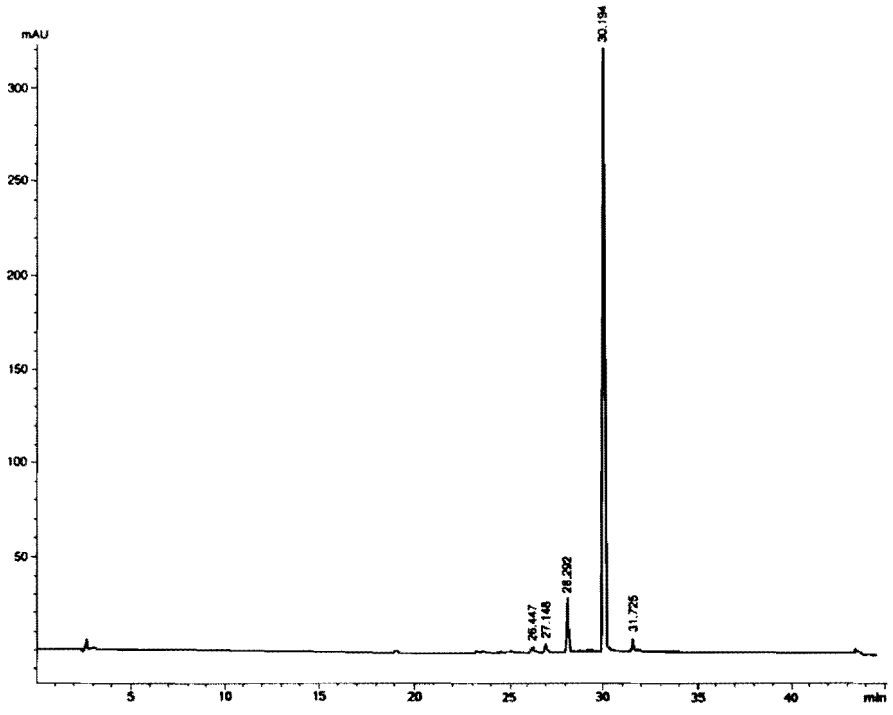

Fig. 1. HPLC of methanol extract of *Neofuscelia pulla* (*J.A. Elix 10906*). R_T 26.447 = oxostenosporic acid, R_T 27.148 = 4-*O*-demethylstenosporic acid, R_T 28.292 = divaricatic acid, R_T 30.194 = stenosporic acid, R_T 31.725 = perlatolic acid.

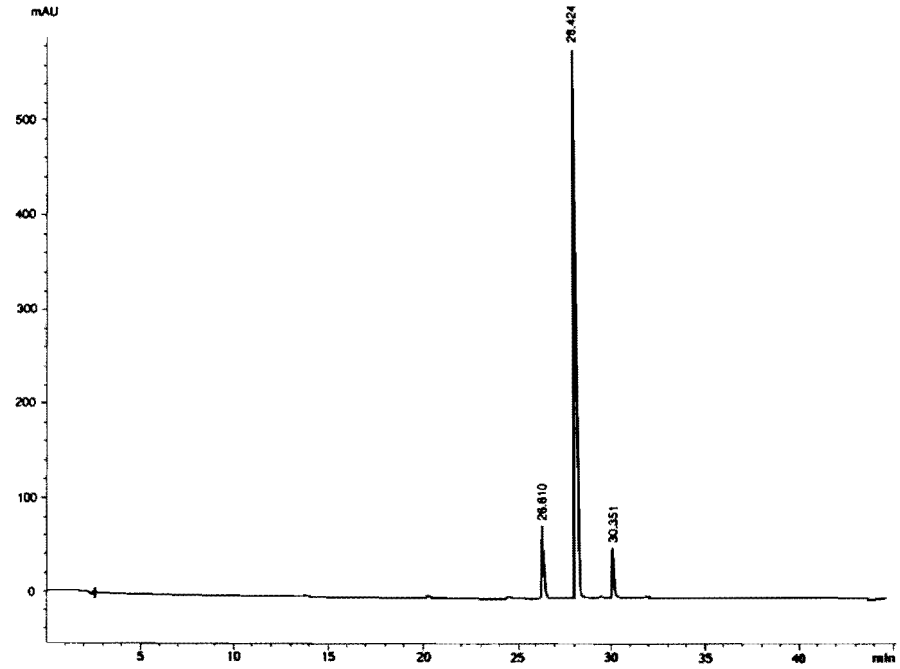

Fig. 2. HPLC of methanol extract of holotype *Parmelia perrugata*. R_T 26.610 = oxostenosporic acid, R_T 28.424 = divaricatic acid, R_T 30.351 = stenosporic acid.

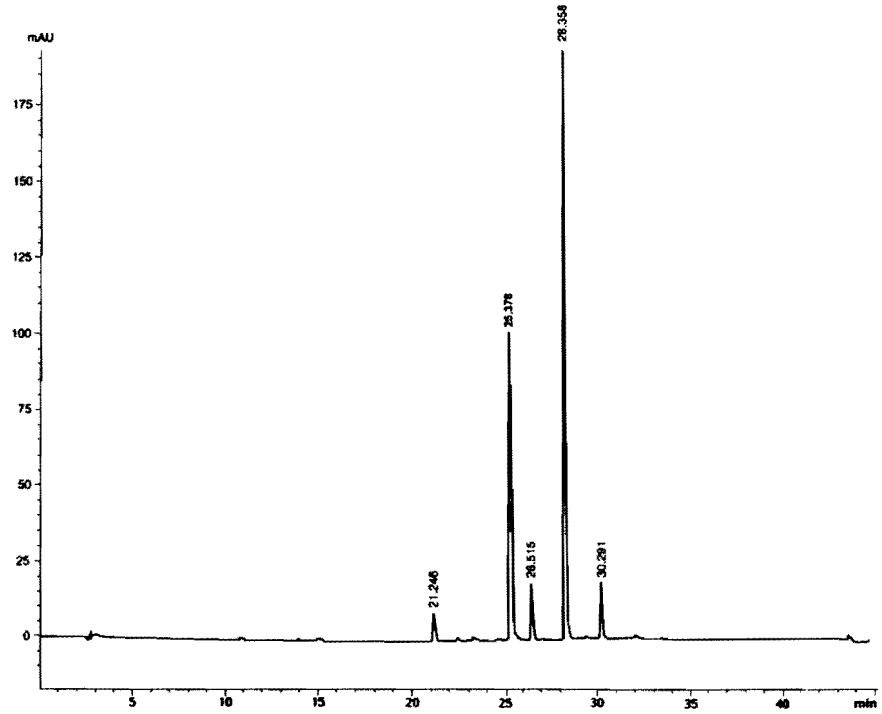

Fig. 3. HPLC of methanol extract of *Neofuscelia perrugata* (*Kammerer et al.*). R_T 21.246 = lecanoric acid, R_T 25.376 = gyrophoric acid, R_T 26.515 = oxostenosporic acid, R_T 28.358 = divaricatic acid, R_T 30.291 = stenosporic acid.

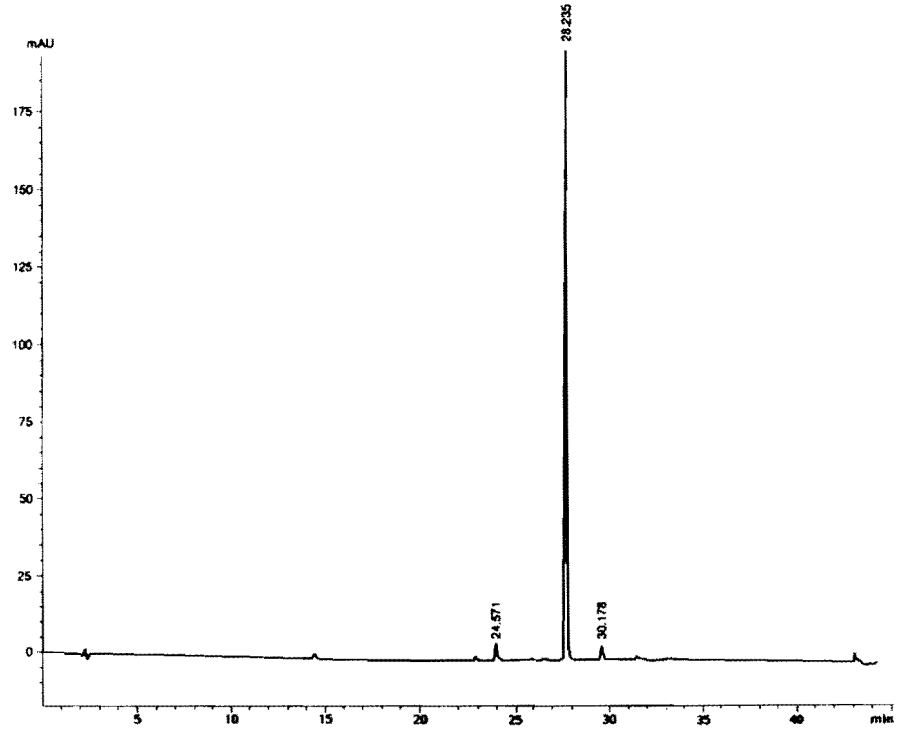

Fig. 4. HPLC of methanol extract of *Neofuscelia subprolixa* (*J.A. Elix 25328*). R_T 24.571 = nordivaricatic acid, R_T 28.235 = divaricatic acid, R_T 30.178 = stenosporic acid.

The typification and status of the name *Ramalina banzarensis* C.W. Dodge

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Abstract: A lectotype for *Ramalina banzarensis* C.W. Dodge, from Macquarie Island is designated, but the species remains *incertae sedis*.

Introduction

Dodge (1948) named *Ramalina banzarensis* based on specimens collected from Macquarie Island on the 1929–1931 British, Australian and New Zealand Antarctic Research expedition (B.A.N.Z.A.R.E.). The name has been accepted in regional revisions by Martin (1968) and by McCarthy (2002) for Macquarie Island. Blanchon *et al.* (1996) noted that they could not confirm the name for New Zealand. Stevens (1987) did not mention the species for Australia.

Almborn (1974) noted of Dodge "This author has caused untold damage to taxonomic lichenology. His publications unfortunately cannot be simply ignored. Future serious lichenologists will have to spend much time and trouble in evaluating and identifying all his many worthless taxa". Castello and Nimis (1995) revised a large number of Antarctic lichens described by Dodge. They found that "some types were just fragments of unrecognizable sterile crusts, the same species was described several times under widely different generic names, the original descriptions do not comply with the characters of the types, the characters given for some species are a mixture of characters of different lichens growing together on the type collection." With these criticisms in mind, we decided to investigate the status of the name *Ramalina banzarensis* C.W. Dodge.

Type Specimen

Botanical collections from the B.A.N.Z.A.R. expedition of 1929–31 were sent to the British Museum (BM), where they were destroyed during World War II. However, the lichens were forwarded to Dodge at the Missouri Botanical Gardens where he was the mycologist (Mawson 1948). Dodge (1948) credits Professor T. Harvey Johnston and Dr J.W.S. Marr with having collected most of the lichen material. Specimens were deposited at the herbarium of the Missouri Botanical Gardens (MO), and duplicates were sent back to the expedition leader, Sir Douglas Mawson, in Adelaide (Dodge 1948). Specimens from MO and Dodge's personal herbarium were later sent to the Farlow Herbarium of Cryptogamic Botany (FH) at Harvard University (Castello & Nimis 1995). Dodge listed 6 specimens of *R. banzarensis*, collected from Featherbed Flat, Macquarie Island (site described as BANZARE 531), preserved in formalin. The specimens were numbers BANZARE 531-25 to 531-30. When FH was contacted, they noted that despite an intensive search, no formalin-preserved type specimen or any other specimen was found, apart from one slide. The slide was annotated *R. inflata* in pencil, then *R. banzarensis* in ink, with an additional label of BANZARE 531 (25 added later) 29, ex Dodge slide box 64). The slide is not clear and could not be identified to species level because the cortex is obscure. However, it does not show a hollow thallus, disagreeing with the description.

A duplicate specimen at Adelaide (AD) in formalin had dried out several times and when filtered there was nothing left resembling a lichen. Searches of other Australian herbaria have found no other material. Suggestions that MO also had

specimens proved incorrect, as their material had already been sent to Farlow. There are no illustrations or photographs available which could be considered as type material.

In the absence of any other material, we designate the only remaining material (the slide from Farlow (BANZARE 531 (25) 29)) as the lectotype for *Ramalina banzarensis* C.W. Dodge.

Description

The description is confusing and is based on formalin-preserved material which no longer exists. Dodge states that the species is "somewhat inflated" and that it is fistulose, although he thought this could be due to degeneration of old soredia. He further stated that the species is closely related to *R. inflata* and *R. geniculata*, "perhaps a sorediate condition derived from one of them". Comparing the description with the anatomy of other *Ramalina* species in the region, it is difficult to find any correlation. The presence of soredia rules out *R. inflata*, while the inflated and fistulose nature would seem to exclude both *R. erumpens* and *R. unilateralis*. The description of the holes as being long and elliptic would also seem to disagree with the morphology of both species, even if they were derived from eroded soralia. Other comments such as "true cortex lacking", and "central portion stuffed with thick-walled brownish hyphae" are not the case for any of the species. No other specimens have been seen which resemble the description.

Subsequent Specimens

Several specimens from Macquarie Island were annotated by Dodge as *Ramalina macquariensis*, then changed to *R. banzarensis* (ANARE m-56-Li-55, ANARE m-56-Li-65, Collector D. Brown, 1956). The name *R. macquariensis* does not appear to have been published. These specimens are redetermined by us as *R. erumpens*.

Dodge later named a specimen from Bird Island in the Foveaux Strait as *R. banzarensis* (1276b ex Dodge folder 1621, Collector Brian Fineran, 1965). This specimen is redetermined by us as *R. erumpens*. Two specimens collected on the later Australian and New Zealand Expedition (1947–1949) and annotated by J. Murray as *R. ?banzarensis* have also been redetermined by us as *R. erumpens*.

Macquarie Island *Ramalina* species

Dodge (1948) listed 2 species for Macquarie Island, *Ramalina banzarensis* and *R. inflata* (J.D. Hooker & Taylor) J.D. Hooker & Taylor. His comments on *R. inflata* note "a small specimen from Macquarie may belong here, it is sterile and probably young". It is highly doubtful that this specimen was in fact *R. inflata*, as his description mentions that the "lumina in cortical cells [is] larger", and "coarse brownish hyphae, loosely interwoven with large air spaces fill [the] central portion", which is similar to the anatomy of *Leifidium tenerum* (Laurer) Wedin. The actual specimen has been untraceable, as he neglected to include a specimen number. Other notes in his description of the species, based on material from the Auckland Islands in the Taylor herbarium at Farlow, are also incorrect. A specimen from the same islands in the Dodge herbarium at Farlow labelled as *R. inflata* var. *gracilis* has been redetermined by us as *Leifidium tenerum*. Another specimen labelled as *R. geniculata* J.D. Hooker & Taylor was also found to be *Leifidium tenerum*. No other material identified as *R. inflata* from Macquarie Island is known to us. It is possible that the species is present, as it is found on Campbell Island and the Auckland Islands, although it is found on the twigs of shrubs and small trees only, a habitat which is lacking on Macquarie Island. Other specimens in herbaria from Macquarie Island have been labelled *R. farinacea* (L.) Ach. and *R. unilateralis* F. Wilson. The latter is a genuine record, while the former has been redetermined by us as *R. erumpens*.

Conclusion

The poor and contradictory description, unclear type specimen and lack of an illustration make it difficult to determine the correct status of *Ramalina banzarensis*. Twenty years after first describing *R. banzarensis*, Dodge identified specimens of *R. erumpens* as *R. banzarensis*, and if these were conspecific the latter name would have priority. However, the protologue of *R. banzarensis* would seem to preclude this possibility, and Dodge's later determinations cannot be counted as evidence. With this in mind, unless clearer type material can be found, we recommend the name *R. banzarensis* be designated *incertae sedis*. We recognize only *R. erumpens* and *R. unilateralis* for Macquarie Island.

Acknowledgements

We would like to thank Scott LaGreca, Rod Seppelt, Graham Bell and the curators of the Farlow Herbarium of Cryptogamic Botany, Harvard University (FH), Royal Botanic Garden, Melbourne (MEL) and the Centre for Plant Biodiversity Research, Canberra (CANB) for information, advice and access to specimens. We thank Mark Large, Phil Garnock-Jones, and one anonymous referee for their comments on this manuscript.

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Ramalina meridionalis, a new species from New Zealand, Norfolk Island and Lord Howe Island

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Abstract: Specimens of *"Ramalina arabum"* from New Zealand, Norfolk Island and Lord Howe Island are recognized as a new species, *R. meridionalis* Blanchon & Bannister.

In their revision of the lichen genus *Ramalina* for New Zealand, Blanchon *et al.* (1996) reinstated the name *R. arabum* (Dill. ex Ach.) Meyen & Flot. The species had been recorded for New Zealand in earlier publications (Müller 1894; Zahlbruckner 1941, Martin 1966, 1968; Galloway 1985), but by the time the checklist of the New Zealand lichens (Galloway 1992) was published, the name was no longer being used. Herbarium specimens were labelled as *R. allanii* de Lesd., *R. australiensis* Nyl., *R. myrioclada* Müll. Arg. or *R. usnea* (L.) R. Howe. Elix *et al.* (1992) recognized the species for Norfolk Island, New Zealand and New Caledonia. Krog (1994) reviewed and typified *R. arabum*, placing specimens from Madagascar and Mauritius within the species, but separating those from the Mediterranean as a new combination, *R. implexa* (Nyl.) Krog. Krog (1994) did not note *R. arabum* for New Zealand, but did discuss the specimens found on Norfolk Island and New Caledonia. She excluded Norfolk Island specimens from *R. arabum s. str.*, based largely on the presence of chondroid strands in the medulla, structures absent from the medulla of *R. arabum s. str.* Krog (1994) tentatively kept New Caledonia specimens separate. Blanchon *et al.* (1996), while reinstating *R. arabum* for New Zealand, discussed the need for future research "to determine the exact status of specimens from New Zealand, Norfolk Island and New Caledonia". In this paper, we describe specimens formerly known as *R. arabum* from northern New Zealand, Norfolk Island and Lord Howe Island as a new species.

Ramalina meridionalis Blanchon & Bannister sp. nov. Fig. 1.
Ramalinae arabo similis, sed in medullis filiis chondroideis, tortilibus juvenibus ramis, apicibus attenuatis et pseudocyphellis longis differt.

Type: **New Zealand**. Northland, Cavilli Islands, Hamaruru Island, 34°58'S, 173°56'E, maritime rocks, *B. & G. Hayward*, 1.i.1979 (AK 161638). Holotype.

Thallus corticolous or saxicolous (in New Zealand rarely corticolous), grey-green to yellow-green, suberect to pendulous, 3–12(–20) cm long, sparse to densely branched; branching mainly dichotomous, often with narrow lateral branches, usually more densely branched at the base where the holdfast can produce several branches; branch width 1.0–2.0 mm, basal branches rigid angular-terete to slightly flattened, apical branches terete-subterete, twisted and somewhat nodulose, attenuate with fine apices which often break, leaving a blunt tip; surface matt, pseudocyphellae always present, numerous, linear, long, often giving a striate or striate-nervose appearance; holdfast delimited; soredia absent. Outer cortex indistinct or absent, chondroid strands present in medulla. Pycnidia present. Apothecia common in Norfolk Island material, less common in New Zealand, not found in Lord Howe material, sessile, lateral, plane to convex, disc 0.5–2.0 mm diam., margin thin, entire; ascospores ellipsoid, 11.5–17 × 5–8 µm.
Chemistry: Medulla K+ red, C–; containing usnic acid (major), norstictic acid (major) and ± connorstictic acid (minor).

Ramalina meridionalis is distinguished from *R. arabum* (Dill. ex Ach.) Meyen & Flot. (Indian Ocean) by the young branches being terete, twisted, often slightly nodulose, with attenuate, finely pointed apices, the numerous long, linear pseudocyphellae, and the presence of chondroid strands in the medulla. The species is further distinguished from *R. australiensis* Nyl., which is found in similar habitats in New Zealand but not Norfolk Island or Lord Howe Island, by the presence of norstictic acid (K+ red), the mainly dichotomous branching that is more dense basally, and the chondroid strands present in the medulla (one of only two species found in Australasia with this anatomy). Specimens from New Caledonia are excluded, based on an absence of chondroid strands and presence of thick-walled hyphae in the medulla. Further work is continuing to determine the status of this material.

Ramalina meridionalis is Australasian in distribution, occurring in Norfolk Island where it is common, and in northern New Zealand where it is found on rocky offshore islands and peninsulas. A recent loan from CANB included an unnamed packet (CBG 9703546) containing a few small thalli collected from basalt on Lord Howe Island. These thalli were found to contain norstictic acid, and further investigation revealed chondroid strands in the medulla, placing the collection in *R. meridionalis*.

REPRESENTATIVE SPECIMENS

New Zealand. *North Island*: •Fanal Island, 35°56'S, 175°09'E, on rocks, *A.E. Wright*, 25.v.1979 (AK 154095); •Slipper Island, Coromandel, 37°03'S, 175°56'E, on *Metrosideros excelsa*, *B. & G. Hayward*, 1.viii.1973 (AK 161637); •Rauhoumaumau Island, Tutukaka, Northland, 35°38'S, 174°33'E, on maritime rocks, *B.W. Hayward*, 1.viii.1980 (AK 169222); •Northeast Island, Three Kings Islands, Northland, 34°08'S, 172°10'E, on rocks, *B.W. Hayward*, 1.xii.1983 (AK 169844); •Northern Mokohinau Islands Group, The Arches, 35°55'S, 175°06'E, alt. 10 m, saxicolous on exposed rhyolite cliffs, *P.J. de Lange*, 13.xi.1993 (AK 233607). **Australia**. *Norfolk Island*: •Ball Bay Reserve, 29°32' S, 167°59'E, 80 m, on *Araucaria* trunk, *H. Streimann* 01.xii.1984 (CANB 9005898); •Cascade Creek, 29°01'20"S, 167°57'50"E, 20 m, on mossy rocks, *J.A. Elix* (CANB 608936); •Captain Cook Monument, 29°00'S, 167°56'E, 120 m, on *Araucaria heterophylla*, *H. Streimann s.n.*, 03.xii.1984 (CANB 626905). *Lord Howe Island*: •Junction of Kim's Lookout and Max Nicholls Tracks, 31°31'08"S, 159°03'01"E, 100 m, on basalt, *J.A. Elix*, 4.ii.1996 (CBG 9703546).

Acknowledgements

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Fig. 1. *Ramalina meridionalis* (holotype). **a**, holotype; **b**, apothecia and elongate pseudocyphellae. Scales **a**, **b** = 10 mm.

Notes on high-alpine species of *Lecanora* from schist underhangs in southern New Zealand, and a new name for *L. parmelinoides*

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Abstract: Sheltered dry underhangs are characteristic of large schist tors that are found on the summits of several mountain ranges in Central Otago in southern New Zealand. These microhabitats support a characteristic lichen mycobiota that is still poorly studied. Among the lichens colonising dry underhangs, the bipolar species *Lecanora bicincta* Ramond, *L. cavicola* Creveld, and *L. swartzii* Ach. are recorded for the first time from New Zealand. *L swartzii* is also known from Australia, and *L. bicincta* from Argentina, but *L. cavicola* appears to be the first reports of this taxon from the Southern Hemisphere. Associated species of *Lecanora* viz. *L. intricata* (a first record for New Zealand), *L. polytropa* and *L. rupicola* are also briefly discussed. *Psoroma lugubre* C.W. Dodge is shown to be an earlier name for *Lecanora parmelinoides* Lumbsch, and accordingly the new combination *L. lugubris* (C.W. Dodge) D.J. Galloway & P.M. Jørg. is proposed.

Introduction

During investigations of the high-alpine lichen mycobiota of the Central Otago mountains, I have been looking at lichens that develop in sheltered, shaded underhangs and recesses, habitats of reduced light and often high humidity (from fog) but sheltered from direct rain. Lichens occurring in these habitats are mainly crustose species, with several being sorediate and only one, *Ramalina fimbriata* (Blanchon *et al.* 1996), being fruticose. Lichen communities of shaded rock crevices and overhangs in Britain are discussed by James (1970) and James *et al.* (1977), but in these accounts high-alpine communities are only briefly mentioned. Wirth (1972) described the association *Lecideetum orostheae* (Hil.) Wirth, from the European Alps, in habitats having a resemblance to the Central Otago schist underhangs. Creveld (1981) gives a detailed syntaxonomic survey of saxicolous lichen communities in the alpine zone of southern Norway, with many of the species discussed there also occurring in the high-alpine zone in Central Otago.

In these high-alpine sheltered dry habitats, the ceilings, vertical walls, and occasionally also the floors of underhangs are colonized by a distinctive lichen community, including three species of *Lecanora* which are known from similar habitats in arctic-alpine regions of the Northern Hemisphere but not previously recorded from New Zealand. These three, viz. *L. bicincta* Ramond, *L. cavicola* Creveld and *L. swartzii* (Ach.) Ach., were earlier noted in a preliminary list of lichens from the Old Man Range (Galloway 2000). They are more fully described here, together with details of their chemistry, associated species and known distributions. At present, all three species appear to be restricted to schistose rocks from the mountain ranges of Central Otago, and are not known so far from greywacke rock. *L. bicincta* and *L. swartzii* are members of the *L. rupicola*-group (including also *L. lojkeana* and *L. rupicola*), a group of saxicolous taxa having a chemistry comprising xanthones, chromones and fatty acids (Leuckert & Poelt 1989), of which the chromone, sordidone (C+ yellow or orange), is most commonly present either in the epithecium alone (*L. bicincta, L. rupicola*) or in both thallus and epithecium (*L. swartzii*). *L. cavicola*, on the other hand, gives a distinctive C+ red or pinkish reaction to soredia and some parts of the thallus (often very fleeting due to varying amounts of alectorialic acid). All three species are additions to the bipolar element in the high-alpine lichen biota of Central Otago (Galloway & Aptroot 1995, Galloway 1999). Notes are also appended here on the co-occurring species *Lecanora intricata* (a first report from New Zealand), *L. polytropa* and *L. rupicola*. All of these species of *Lecanora* (apart from *L. polytropa*) appear to have quite narrow distribution ranges in New Zealand, although whether this is an artefact of limited collecting or whether it represents accurate range restriction is yet to be determined.

L. bicincta Ramond, *Mém. Mus. Hist. Nat.* 13: 248 (1825)

Illustrations: Leuckert & Poelt (1989: 136, fig. 2); St. Clair (1999: 95).
Description: Thallus crustose, thick, areolate-cracked, spreading in irregular bands or patches, (0.5–)1–2(–2.5) cm diam., without a delimiting prothallus. Upper surface smooth to somewhat roughened, white, tartareous, cracks between areolae very narrow to somewhat gaping. Apothecia scattered, rather sparse, rounded (0.05–)0.01–0.05(–0.8) mm diam., subimmersed in areolae at first, becoming sessile at maturity; margins concolorous with thallus, only very slightly raised; disc plane to subconvex, blue-black, thickly white-pruinose (pruina C+ brilliant yellow), often difficult to distinguish from remainder of thallus. Epithecium brownish green (N+ red). Hymenium 60–70 µm tall. Ascospores ellipsoid, 8–15 × 5–8 µm.
Chemistry: Thallus K+ yellow, C–, Pd–; disc K–, C+ brilliant yellow, Pd–; containing atranorin and sordidone.

Notes: *Lecanora bicincta* is a bipolar high-alpine species occurring on overhanging or vertical hard, smooth schist rocks, and in underhangs, associating with *Aspicilia* spp., *Karoowia* cf. *adhaerens*, *Lecanora cavicola, L. polytropa, L. rupicola, L. swartzii, Protoparmelia badia, Ramalina fimbriata, Rhizocarpon geographicum* and *R. grande*. In the Northern Hemisphere it is known from Europe, Scandinavia, the Balkans, arctic Russia, North America (Eigler 1969, Nimis & Poelt 1987, Leuckert & Poelt 1989, Obermayer 1993, Santesson 1993, Nimis 1993, Esslinger & Egan 1995, Andreev *et al.* 1996, Nash *et al.* 1998, Hafellner 2000, Hafellner & Obermayer 2001, Hafellner & Türk 2001). In the Southern Hemisphere it has been recorded to date from only Argentina (Calvelo & Liberatore 2001).

Lecanora bicincta is distinguished by the white, areolate-cracked thallus (C–) and the subimmersed apothecia having a blue-black disc thickly covered with white pruina (pruina C+ brilliant yellow indicating presence of sordidone). It is part of the *L. rupicola* aggregate (Leuckert & Poelt 1989, Nimis 1993, Foucard 2001) and in Europe four chemotypes are recognized (Leuckert & Poelt 1989). It is still poorly collected and understood in New Zealand, where at present it is known from a few high-alpine habitats in Central Otago. The lichenicolous fungus *Arthonia glaucomaria* Nyl. is reported as parasitizing apothecial discs of *L. bicincta* (Leuckert & Poelt 1989) and should be looked for in New Zealand populations. Other lichenicolous fungi parasitizing *L. bicincta* are *Arthonia varians* (Davies) Nyl. (Hafellner 2000) and *Rimularia insularis* (Obermayer 1993).

SPECIMENS EXAMINED

Otago: •Poolburn Reservoir, on hard schist, on NW-facing vertical to overhanging smooth faces of schist tor in alpine grassland, 900 m, 19.i.2001, *D.J. Galloway 5225* (CHR, OTA); •Manorburn Reservoir, dry roof and vertical walls of underhangs in schist tor in depleted grassland, 880 m, 8.i.2002, *D.J. Galloway 5178* (CHR 533578); •Ridgetop watershed of Taieri and Teviot Rivers, above Lake Onslow (N end), on N side of schist tor in overhangs (roof and sides), 890 m, 3.i.2001, *D.J. Galloway 2458 pr.p.* (CHR 533458); •Teviot River, just downstream of Lake Onslow Dam, on steep, hard, smooth, vertical schist faces (ends of outcrop) and roof of underhang, 680 m, 9.ii.2002, *D.J. Galloway 5184* (CHR 533584); •Rock & Pillar Range, summit, 1430–1449 m, 28.i.1985, *H. Mayrhofer 10.608, H. Hertel & A.F. Mark* (ex GZU, CHR 485932); •Flagstaff Hill near Dunedin, rock outcrops near the summit, c. 650 m, 1.ii.1985, *H. Mayrhofer 13.678, 13.679 & H. Hertel* (ex GZU, OTA 057196; CHR 544227).

L. cavicola Creveld, *Bibliotheca Lichenologica* **17**: 273 (1981)

Illustrations: Creveld (1981: 275, fig. 66a, 66b); Poelt & Leuckert (1984: 415, figs 1–5); Foucard (1990: fig. 132).
Description: Thallus crustose, thick, in small clumps or patches, or in bands in crevices, to widespreading in continuous patches (0.5–)1–5(–8) cm diam., areolate-cracked, on a stringy to byssoid, white prothallus, visible between widely separated areolae or at the margins, sometimes in deeply shaded habitats extending to 1 cm beyond the areolae. Areolae rounded to irregular, angular, separated by narrow to deep cracks, or tightly crowded-conglomerate, (0.5–)1–3(–5) mm diam., verrucose to squamulose to distinctly swollen and hummocky or blister-like to convoluted-cerebriform, eventually becoming subfruticose. Upper surface matt to slightly glossy, smoothly rounded to somewhat lumpy, pale olive-green to grey-green, or pale fawnish or creamish on surfaces exposed to light, white below, with or without soredia. Soralia round to irregular, shallowly to deeply erose, 0.1–2 mm diam., developing initially at base and side of areolae, later occasionally eroding whole surface. Soredia whitish, yellowish, greenish or dark grey, farinose, C+ red (fleeting). Apothecia very rare, seen only twice in New Zealand material, the rather under-developed discs not producing asci or ascospores. Poelt & Leuckert (1984) record apothecial development in European specimens of *L. cavicola*, giving the following data: Hymenium 50–70 µm tall, paraphyses 1.5–2 µm thick. Ascospores subglobose to shortly ellipsoid, moderately thick-walled, 6.5–10(–13.5) × 5–7 µm. Pycnidia frequent, scattered to crowded, immersed, ostiole black, minute, slightly depressed. Conidia slender, slightly curved, colourless, 16–18 × 1 µm.
Chemistry: Thallus and soralia K+ yellow, C+ pinkish red to scarlet (often fleeting), Pd–; containing atranorin and alectorialic acid (Poelt & Leuckert 1984).

Notes: *Lecanora cavicola* is a high-alpine bipolar lichen described from the mountains of southern Norway (Creveld 1981). It colonises siliceous rocks in deep cracks, small caverns and especially on the ceilings of shady underhangs of schist tors, a position not routinely looked at by lichenologists. In this dry, rather specialized habitat, it is commonly the dominant lichen present. It also associates with *Caloplaca lutea*, *Diploschistes* spp., *Lecanora bicincta*, *L. intricata*, *L. polytropa*, *L. swartzii*, *Lecidea* spp., *Pertusaria* spp., *Protoparmelia badia*, *Ramalina fimbriata*, *Rhizocarpon geographicum*, *R. grande* and *Umbilicaria krascheninnikovii*.

Lecanora cavicola is characterized by the olive-green-grey to fawnish or dirty creamish (it becomes yellow-brown to cinnamon-brown on storage in the herbarium), hummocky to bullate thallus of swollen areolae, with a glossy to matt surface; greenish to whitish, farinose soralia (C+ red), and a fimbriate, white marginal prothallus visible between areolae and at margins. Its systematic position within *Lecanora* is still a matter of discussion (Poelt & Leuckert 1984). *L. cavicola* is known also from Norway (Creveld 1981), Sweden (Santesson 1993), Russia, the Alps of Central Europe (Poelt & Leuckert 1984; Hafellner 1989, 2000; Obermayer 1993; Hafellner & Obermayer 2001; Hafellner & Türk 2001), Greenland (Alstrup *et al.* 2000) and Arizona, Colorado and Washington State in North America (Nash *et al.* 1998). Exsiccatum specimens from Styria in Austria were distributed by Vězda (1984, No. 1961). It is not known elsewhere in the Southern Hemisphere.

SPECIMENS EXAMINED
Otago: •Dunstan Mountains, on fellfield outcrop, 1615 m, 13.v.1970, *P. Child 228* (CHR 444530); •Poolburn Reservoir, near fishing huts, vertical faces of schist, at back of dry underhang of schist tor in grassland, 750 m, 8.xi.2000, *D.J. Galloway 5188, 5189* (CHR 533588, 533589, OTA); •Poolburn Reservoir, high point of ridge near top airstrip, dry roof and vertical walls of underhangs in schist tor in alpine tussock grassland, 900 m, 9.iii.2002, *D.J. Galloway 5198* (CHR 533611, OTA); •Manorburn Reservoir, dry roof and vertical walls of underhangs of schist tor in depleted grassland, 880 m, 8.i.2002, *D.J. Galloway 5177* (CHR 533577, OTA); •Teviot River, just downstream of Lake Onslow Dam, on steep, hard, smooth, vertical schist faces (ends of outcrop) and roof of underhang, 680 m, 9.ii.2002, *D.J. Galloway 5183* (CHR 533583); •Old Man Range, Syme's Road, on shady side of rotten schist outcrop, 1217 m, 10.viii.1970, *P. Child 661* (CHR 444531); •Old Man Range, half a mile S of Obelisk, on edges of quartzy vertical crevice in tor, S aspect, 1661 m, 18.xii.1970, *P. Child 1163* (CHR 444532); •Old Man Range, N end, covering large areas on underside of overhangs in large tors, S-facing side, 1646 m, 3.ii.1985, *P. Child 2092* (CHR 444533); •Old Man Range, tors between Obelisk and Hyde Rock, 1600 m, steeply sloping or vertical faces and on roof of overhangs on schist tors, 7.ii.1999, *D.J. Galloway 5202* (CHR, OTA), •Old Man Range, S end, Skier's Rock above Waikaia Bush Road, dry roof and vertical walls of underhangs in schist tor in alpine tussock grassland, 1280 m, 3.ii.2002, *D.J. Galloway 5182* (CHR 533582, OTA); •Rock & Pillar Range, summit, c. 1430–1449 m, 28.i.1985, *H. Mayrhofer 10.596, H. Hertel & A.F. Mark* (GZU) *pr.p.*; •Rock and Pillar Range, Museum Rock near Stonehenge, dry roofs and vertical walls of underhang in schist tor in alpine tussock grassland, 1380 m, 18.i.1996, *D.J. Galloway 5194, 5196* (CHR 533607, 533609).

L. intricata (Ach.) Ach., *Lich. Univ:* 380 (1810)
≡ *Parmelia intricata* Ach., *Meth. Lich.:* 178 (1803).

Illustrations: Moberg & Holmåsen (1982: 113); Wirth (1987: 237); Hansen (1995: 94); Dobson (2000: 196).
Description: Thallus irregularly spreading, 1–3 cm diam., thick, closely attached, forming a continuous to areolate-cracked crust of flattened areolae. Areolae 0.5–1(–2) mm diam., separated by narrow to deep cracks and resembling a jigsaw pattern, margins often somewhat crenulate; prothallus black, inapparent at margins, visible between gaping cracks in areolae. Upper surface flat to convex, pale watery grey-green to yellowish green, smooth to finely wrinkled, matt to somewhat glossy, without soredia. Apothecia central, (0.1–)0.2–1.0(–1.5) mm diam., immersed to sessile, not constricted at base, 1–4 per areole; thalline exciple at first entire and slightly raised, becoming flexuose and eventually ± excluded, concolorous with thallus, disc blackish green, olive-green to greenish brown, at maturity somewhat piebald, never yellow, concave at first, soon becoming plane to subconvex, matt or slightly glossy, epruinose. Hymenium 60–70 µm tall; epithecium greenish brown. Ascospores (8–)10–14(–15) × 4.5–7 µm.
Chemistry: Thallus K– or + yellow, KC+ yellow, C–, Pd–; containing usnic acid and zeorin.

Notes: A rare bipolar species apparently but obviously overlooked, since it is commonly confused with *L. polytropa*. It is readily distinguished from *L. polytropa*, however, by the different colour of the thallus and apothecia, the crenulate margins of the areolae, the jigsaw-patterned surface, the mainly immersed apothecia with darker, olive-green to greenish brown or even somewhat blackish green discs that do not become strongly convex, and the generally more continuous thallus (Hawksworth & Dalby 1992). In the specimen seen from Gem Lake, the lichen is particularly well-developed, forming a mosaic of crustose lichens together with *Candelariella coralliza*, *Lecanora polytropa*, *Protoparmelia badia* and *Rhizocarpon*

lecanorinum. In his study of Central European alpine lichen communities on siliceous rocks, Wirth (1972) recognized *L. intricata* as a member of the *Rhizocarpion alpicolae*, which is characterized by species such as *Bellemerea alpina, Lecanora polytropa, Miriquidica nigroleprosa, Pseudephebe pubescens, Rhizocarpon alpicola, R. geographicum* and *Umbilicaria cylindrica* (Owe-Larsson & Rambold 2001).

Lecanora intricata is known also from Great Britain (Purvis *et al.* 1992), Europe, including Macaronesia (Lettau 1956, Eigler 1969, Nimis 1993, Scholz 2000, Llimona & Hladun 2001, Hafellner & Türk 2001), Scandinavia (Creveld 1981, Santesson 1993), Svalbard (Aptroot & Alstrup 1991, Elvebakk & Hertel 1996), Greenland (Hansen 1995), arctic Russia (Andreev *et al.* 1996), North America (Thomson 1979, Esslinger & Egan 1995, Brodo *et al.* 2001) and the South Shetland Is in Antarctica (Øvstedal & Lewis-Smith 2001).

SPECIMENS EXAMINED

Otago: •Old Man Range, S end, Skier's Rock above Waikaia Bush Road, 1280 m, dry roof and vertical walls of underhangs in schist tor in alpine tussock grassland, 3.ii.2002, *D.J. Galloway 5186 pr.min.p.* (CHR 533586); •Umbrella Mountains, Gem Lake, rare on top surfaces of lakeside boulders, nutrient-enriched with bird droppings, 1312 m, 9.iii.1986, *P. Child 2840* (CHR 444515).

L. polytropa (Hoffm.) Rabenh., *Dtsch. Kryptfl.* **2:** 37 (1845)
≡ *Verrucaria polytropa* Hoffm., *Dtsch. Fl.:* 196 (1796).
= *Lecidea aceriviformis* J. Murray, *Trans. Roy. Soc. N. Z. Bot.* **2** (5), 66 (1963). Type: Antarctica. Victoria Land, Cape Hallett, 72°25'S, 170°55'E, "Crater Cirque, Hallett Base", 488 m, 11–12.i.1958, *W.G. Croll, E.B. Fitzgerald, H.J. Harrington & I.C. McKellar* (WELT L-84 – holotype). See also Hertel (1983: 446).

Illustrations: Moberg & Holmåsen (1982: 114); Wirth (1987: 241. 1995: 455); Hansen (1995: 95); Malcolm & Galloway (1997: 69, 100); Thomson (1997: 300); Malcolm & Malcolm (2000: 129); Gilbert (2000: pl. 10A); Dobson (2000: 198); Printzen (2001: 385, fig. 2E; 396, fig. 5D); Brodo *et al.* (2001: 387, pl. 432).
Description: Galloway (1985: 217).

Notes: *Lecanora polytropa* occurs on alpine to high-alpine rocks (schists and greywacke to 3550 m on the middle peak of Mt Haast), on flat, exposed rock surfaces, on pebbles in fellfield, and on vertical sides and roofs of overhangs and caves where it may become hummocky-pulvinate. It is most common east of the Main Divide in South Island and is also known from the summit of Mt Hikurangi in North Island, though high-alpine records from North Island are still almost non-existent. It is also quite often found at much lower altitudes on mineralised substrata such as on old weathered, rusted iron gates, railings (especially around headstones in graveyards), abandoned metal fluming, wheels, pipes and dredge buckets, on weathered lignum such as the tops of old tanalized fenceposts and abandoned farm and industrial machinery, and on flaking painted surfaces where the paint is rich in iron oxide. It is also quite common in urban environments on old painted surfaces of wooden railings, on concrete coping and kerbing along fencelines where the surfaces are washed periodically by leached iron slats from metal railings and/ or fence wires (see also Brightman & Seaward 1977, Gilbert 2000). On man-made substrata it commonly associates with *Candelariella vitellina, Physcia adscendens*, and *P. caesia*. Along with *Carbonea vorticosa*, it was recorded from a height of 7400 m in the Himalaya, the highest known altitude for lichens (Hertel 1977, 1988a). *L. polytropa* is a characteristic species in the alliance *Umbilicarion cylindricae* Frey (James *et al.* 1977) and is a characteristic chionophobic species on tops of boulders in areas of late snow-lie (Fryday (2001).

Lecanora polytropa is widely distributed in the Northern Hemisphere, being known from Great Britain (Purvis *et al.* 1992), Europe (Lettau 1956, Eigler 1969, Nimis 1993, Scholz 2000, Llimona & Hladun 2001, Hafellner & Türk 2001), Scandinavia (Santesson 1993), Svalbard (Aptroot & Alstrup 1991, Elvebakk & Hertel 1996), Greenland (Hansen 1995), arctic Russia (Andreev *et al.* 1996), North America (Esslinger & Egan 1995, Brodo *et al.* 2001). In the Southern Hemisphere, it is known from Chile (Galloway & Quilhot 1999), Argentina (Calvelo & Liberatore 2001), the South Shetland Is in Antarctica (Øvstedal & Lewis-Smith 2001), the Falkland Is (Fryday & Prather 2001), Mt Kinabalu (Sipman 1993), Hawaii (Magnusson 1956, Smith 1991, Elix & McCarthy 1998), and Australia (McCarthy 2002).

Lecanora polytropa is readily characterized by the clusters of convex yellow apothecia and the virtual absence of thallus. However, when growing in shaded underhangs, a distinct greenish to yellow-green, glossy thallus is commonly developed. In the Northern Hemisphere, *L. polytropa* is commonly parasitized by several lichenicolous fungi, including *Carbonea aggregantula* (Müll. Arg.) Diederich & Triebel, *C. supersparsa* (Nyl.) Hertel, *Cercidospora epipolytropa* (Mudd) Arnold, and *Muellerella pygmaea* var. *athallina* (Müll. Arg.) Triebel (Hawksworth 1983, Triebel 1989, Alstrup & Hawksworth 1990, Obermayer 1993, Hafellner 2000, Hafellner & Obermayer 2001), all of which should be sought in New Zealand populations, which commonly show signs of parasitism by lichenicolous fungi.

SELECTED SPECIMENS EXAMINED

Gisborne: •Raukumara Range, Mt Hikurangi, summit rocks, 1762 m, *J.K. Bartlett 22840* (AK 191280). *Nelson:* •Ruby Lake, *J.K. Bartlett s.n.* (OTA 191281). *Westland:* •Mt Haast, Middle Peak, on greywacke, 3550m, 10.i.1967, *R.G. Cunninghame 2508a* (CANU). *Marlborough:* •Seaward Kaikoura Range, track to Mt Fyffe, on rock, 1502 m, 30.x.1993, *B. Polly s.n.* (WELT L 4392). *Canterbury:* •Broken River Ski Basin, alpine *Chionochloa pallens–C. macra* grassland, boulder field, 1570 m, 4.xi.1989, *A.J. Fife 9404* (CHR 477256); •Mt Hay Station, Tekapo, xi.1958, *Mason 236/232* (OTA 049145). *Otago:* •Mt Sutton, Lake Ohau, 702 m, *J. Murray 1768* (OTA 049148); •Treble Cone, W Wanaka, on rotten schist, near summit, 2098 m, 21.iii.1971, *P. Child 1376* (CHR 444392); •W Hunter Valley, Rees Valley, on schist boulders, 1218 m, 21.i.1971, *P. Child 1338* (CHR 444391); •Dunstan Mountains, top surfaces, flakey schist in fellfield, 1432 m, 13.v.1970, *P. Child 221* (CHR 444389); •St Bathans Range, summit ridge, 2085 m, 10.i.1972, *J. Child 1438 pr.min.p.* (CHR 384487); •Mt Pisgah, summit rocks, *J.S. Thomson T1917* [ZA 4050] (CHR 371501); •Rock and Pillar Range, on rock, 1312 m, 6.xii.1972, *C.D. Meurk s.n.* (CHR 544214); •Lammerlaw Range, c. 1 km N of trig, 1128 m, on surface of quartz stone in tundra area, 8.ii.1986, *P. Child 2673* (CHR 444397); •Old Man Range, 2 km S of Hyde Rock, on old fencing wire, near ruins of old stone hut, 1585 m, 5.ii.1985, *P. Child 2103* (CHR 444388); •Umbrella Mountains, Gem Lake, thick hummocky patches thriving on lakeshore boulders nourished by bird droppings (paradise duck, black-backed gull), 1312 m, 9.iii.1986, *P. Child 2851* (CHR 444399); •Ram Rock, near Waikouaiti Reservoir, *J.S. Thomson T 1925* (OTA 030337); •Pulpit Rock, Silver Peaks, iii.1959, *J. Murray 4227* (OTA 049146); •Paradise Track, Otago Peninsula, on decorticated wood (fencepost), x.2001, *J.M. Bannister s.n.* (OTA 056876). *Southland:* •West Dome, northern slopes above Windley River, hard volcanic rock in serpentine scrub, 550 m, 9.ix.1999, *D.J. Galloway 5274* (CHR 533666).

L. rupicola (L.) Zahlbr., *Cat. lich. Univ.* 5(3): 437 (1928)
≡ *Lichen rupicola* L., *Mant. Pl.* 1: 132 (1767).
= *Lecidea sticticarpa* Zahlbr., *Denkschr. Akad. Wiss. Wien math.-naturwiss. Kl.* **104**: 297 (1941). Type: **New Zealand.** *Otago:* Waikouaiti Reservoir, on rocks, i.1935, *J.S. Thomson T1861* [ZA 400] (W! - holotype, CHR 347063! – isotype). For notes on the holotype and on discrepancies in Zahlbruckner's description of *Lecidea sticticarpa* see Hertel (1983).

Illustrations: Moberg & Holmåsen (1982: 115); Wirth (1987: 245. 1995: 457); Vitt *et al.* (1988: 196); Leuckert & Poelt (1989: 126, pl. 1; 136, fig. 2); Dobson (1992: 170); Hansen (1995: 96); Malcolm & Galloway (1997: 100, 150, 178); Thomson (1997: 303); Baron (1999: 49, fig. 39); St. Clair (1999: 102); Malcolm & Malcolm (2000: 30); Gilbert (2000: pl. 11B); Dobson (2000: 200); Brodo *et al.* (2001: 387, pl. 433).
Description: Galloway (1985).
Chemistry: Thallus K+ yellow, C–, KC+ yellow; apothecial disc C+ yellow or orange, KC+ orange; containing sordidone, atranorin, roccellic acid in the apothecia and atranorin and roccellic acid in the thallus (Leuckert & Poelt 1989).

Notes: In New Zealand, *Lecanora rupicola* occurs on exposed rock outcrops and slabs in subalpine grassland in full sunlight, and also occasionally on ceilings of underhangs (generally towards the edges where light levels are higher) of schist tors in high-alpine habitats, from 450 m to 1650 m. It is a cosmopolitan species of wide distribution, being known also from Great Britain, Europe, Scandinavia, Svalbard, Greenland, North America, Asia, Argentina and Australia (Eigler 1969, Leuckert & Poelt 1989, Hawksworth & Dalby 1992, Santesson 1993, Nimis 1993, Esslinger & Egan 1995, Andreev *et al.* 1996, Kondratyuk *et al.* 1996, Elvebakk & Hertel 1996, Brodo *et al.* 2001, Calvelo & Liberatore 2001, McCarthy 2002).

Lecanora rupicola is characterized by the pale brown, grey-white to bluish white-pruinose discs which react C+ yellow-orange. It is part of a group of related lichens that include *L. bicincta* and *L. swartzii*. The group is discussed by Leuckert & Poelt (1989), who define infraspecific taxa and chemodemes within each species. This aggregate deserves closer study in New Zealand, where it seems best developed on rocks in upland and alpine habitats of Central Otago. The thallus is often parasitized by *Rimularia insularis* that gradually grows throughout the hyphae of the host, taking over the host's photobiont cells. Apothecial discs are sometimes also parasitized by *Arthonia glaucomaria* Nyl. and *A. varians* (Davies) Nyl., causing the discs to become blackened (Baron 1999: 49, fig. 39). Leuckert & Poelt (1989) record the following lichenicolous taxa as parasites on *L. rupicola: Buellia* sp., *Opegrapha maculans*, *Rhizocarpon inimicum* and *Rinodina insularis*. Those lichenicolous fungi should be searched for in New Zealand populations.

SPECIMENS EXAMINED
Canterbury: •Rocky Peak near Mt Sinclair, Banks Peninsula, on volcanic outcrop near summit, 687 m, 6.iii.1985, *P. Child 2189* (CHR 444677); •Devil's Gap, East Peak, Banks Peninsula, basalt rock, 19.i.1985, *C.D. Meurk & H.D. Wilson* (CHR 543844); •Upper Godley Valley, 762 m, top of rock, 22.viii.1958, *D. Scott 235* (OTA 057283); •Lake Tekapo Camp, on rocks above the lake, 762 m, 7.x.1970, P. *Child 822* (CHR 444315); •Pukaki, rock in long grass foot of lake reserve above road, i.2002, *A. Knight s.n.* (OTA 056968). *Otago:* •Horse Range near Dunback, *J.S. Thomson T1591* (OTA 030327); •Poolburn Reservoir near fishing huts, vertical face of schist, at back of dry underhang of schist tor in grassland, 750 m, 8.xi.2000, *D.J. Galloway 5187* (CHR 533587); •Old Man Range, S end, Skier's Rock above Waikaia Bush Road, dry roof and vertical walls of underhangs in schist tor in alpine tussock grassland, 1280 m, 3.ii.2002, *D.J. Galloway 5180* (CHR 533580, OTA); •Rock and Pillar Range, Museum Rock near Stonehenge, dry roof and vertical walls of underhangs in schist tor in alpine tussock grassland, 1380 m, 18.i.1996, *D.J. Galloway 5193* (CHR 533606); •Stoneburn, on rock, *J.S. Thomson T 2553* (OTA 047340); •Ram Rock, Waikouaiti , *J.S. Thomson T 1927* "looks unusual" [ZA 687 – cited by Zahlbruckner (1941) as *Lecanora rupicola* f. *decussata*] (CHR 345879); •Waikouaiti Reservoir, on rocks, *J.S. Thomson T1861* (CHR 347063); •Waikouaiti River, on rock, *J.S. Thomson T 2936* (OTA 047978); •Maungatua, on rock, 457 m, *J.S. Thomson T 2386* (OTA 029918).

L. swartzii (Ach.) Ach., *Lich. Univ.*: 363 (1810)
≡ *Verrucaria swartzii* Ach., *K. Vetensk.-Akad. N. Handl.*: 185 (1794).

Illustrations: Wirth (1987: 247. 1995: 487); Leuckert & Poelt (1989: 127, fig. 2); Poelt (1989: 68, fig. 1; 69, fig. 2; 70, fig. 3); Hansen (1995: 97 – as *L. subradiosa*).
Description: Thallus in spreading rosettes, 0.5–2.5(–3) cm diam., continuous to somewhat effuse at margins, cracked-areolate centrally, often becoming clumped-caespitose to subfruticose, uneven or wrinkled, white, grey-white to grey-brown, surface smooth to roughened, strongly C+ yellow-orange (containing sordidone). Prothallus white, marginal, byssoid, C+ yellow-orange. Apothecia clustered centrally, (0.1–)0.5–1(–1.5) mm diam., immersed at first, becoming sessile and soon distinctively convex, strongly constricted at base or often at the tips of subfruticose stalks, rounded to angular, separated by deep cracks or conglomerate, the apothecia rather easily detached from thallus, thalline margin narrow, very slightly raised, entire, flexuous, at length becoming excluded, concolorous with thallus or darker; disc convex, often strongly so, yellow-brown to brown-black, shining, densely grey-pruinose, appearing bluish (C+ yellow). Epithecium colourless to olive-greenish, inspersed with granules. Hymenium 60–85 µm tall; paraphyses simple, 2–2.5 µm wide, apices slightly thickened. Ascospores ellipsoid (9–)10–12(–14) × 5–6(–7) µm.
Chemistry: Thallus: C+ yellow or orange, KC+ orange; apothecial margins C+ yellow or orange, KC+ orange, PD–; apothecial discs C+ yellow or orange, KC+ orange; containing sordidone, thiophanic acid, roccellic acid and atranorin (Leuckert & Poelt 1989).

Notes: *Lecanora swartzii* is a bipolar arctic-alpine species occurring in New Zealand on vertical or steeply sloping sides and ceilings of underhangs and dry caves of high-alpine rocks, especially of schist tors, often occurring with *Caloplaca lutea, Lecanora bicincta, L. cavicola, L. polytropa, L. rupicola,* pale greenish forms of *Protoparmelia badia, Ramalina fimbriata, Rhizocarpon geographicum, R. grande* and *Xanthoria elegans* (Umbrella Mountains population). It is known also from upland Britain (Hawksworth & Dalby 1992, Gilbert 2000 who notes of it "...The latter [*L. swartzii*] is only associated with underhangs sufficiently large to provide shelter for three or four people in a rainstorm"), the high mountains of Europe including Sardinia (Nimis & Poelt 1987; Leuckert & Poelt 1989; Wirth 1987, 1995; Nimis 1993) Scandinavia (Creveld 1981; Foucard 1990, 2001; Santesson 1993), Greenland (Hansen 1995), Svalbard (Aptroot & Alstrup 1991, Elvebakk & Hertel 1996), Arizona in North America (Nash *et al.* 1998) and from the summit of Mt Aggie, Brindabella Range, Australian Capital Territory [collected from schistose rocks at 1485 m by *Thorsten Lumbsch, Andreas Dickhauser* and *Jack Elix*, 9.x.1994 – AK 233353 duplicate ex ESS (Ewen Cameron, *pers. comm.*)]. It is still rather poorly known and collected in New Zealand.

Lecanora swartzii is characterized by rosette-forming to spreading whitish thalli which are immediately and strongly C+ yellow-orange and the distinctly convex apothecia which are grey-pruinose. It occurs sympatrically in these habitats with *L. rupicola,* but is separated by the C+ yellow-orange reaction (sordidone) of the thallus (*L. rupicola* has sordidone only in the apothecial discs). This lichen is characteristic of dry, shaded caves or underhangs and is not found in exposed, sunny situations where *L. rupicola* is mainly found. The development of small, fruticose forms of *L. swartzii* from the predominantly crustose form is discussed in detail in Poelt (1989) and commented on by Lumbsch & Feige (1994).

SPECIMENS EXAMINED
Otago: •Poolburn Reservoir near fishing huts, on vertical face of schist, at back of dry underhang of schist tor in grassland, 750 m, 8.xi.2000, *D.J. Galloway 5190* (CHR 533590, OTA); •Manorburn Reservoir, dry roof and vertical walls of underhangs in schist tor in depleted grassland, 880 m, 8.i.2002, *D.J. Galloway 5179* (CHR 533579, OTA); •Teviot River just downstream of Lake Onslow Dam, on steep, hard, smooth, vertical schist faces (ends of outcrop) and roof of underhang, 680 m, 9.ii.2002, *D.J. Galloway 5185* (CHR 533585, OTA); •Rock and Pillar Range, Museum Rock near Stonehenge, on dry roof and vertical walls of underhangs in schist tor in alpine tussock grassland, 1380 m, 18.i.1996, *D.J. Galloway 5192, 5195* (CHR 533605, 533608); •Old Man Range, S end, Skier's Rock above Waikaia Bush Road, on dry roof and vertical walls of underhangs in schist tor in alpine tussock grassland, 1280 m, 3.ii.2002, *D.J. Galloway 5181, 5186* [deeply shaded form with smooth, glossy surface and without surface pruina] (CHR 533581, 533586); •Umbrella Mountains, above Gem Lake, dry underhangs of steep rock bluffs above lake, 1440 m, 17.iii.1997, *D.J. Galloway 5191* (CHR 533604).

The identity of *Psoroma lugubre* C.W. Dodge
During a recent investigation of published names in *Psoroma*, Prof. Per Magnus Jørgensen obtained the type of *Psoroma lugubre* C.W. Dodge from the Farlow Herbarium and in a letter to me (2.iv.2002) he wrote "...Just today I got the types from FH of two *Psoroma* species which I believe is of some interest to you. It is *P. lugubre* Dodge (from New Zealand, Canterbury, Betwixt Hill, L. Visch B33) and *P. macquariensis* Dodge (Macquarie Isl., N.M. Haysom MI/49/Z100). Both of them are *Lecanora* species growing in association with cyanobacteria. The first belongs in the *L. broccha* group. What are you doing with this name in your revised list? It is not in the flora...". On checking the original description of *Psoroma lugubre* (Dodge 1971: 467–468), which was based on terricolous material collected by Max Visch from the Cass area in 1958, it was obvious that Dodge's description referred to *Lecanora parmelinoides* Lumbsch (Lumbsch *et al.* 1994) and since Dodge's epithet has priority, we accordingly make the new combination below. Dr H.T. Lumbsch (Essen) is in agreement with this proposal.

Lecanora lugubris (C.W. Dodge) D.J. Galloway & P.M. Jørg., comb. nov.
Basionym: *Psoroma lugubre* C.W. Dodge, *Nova Hedwigia* **19**, 467 (1971) ["1970"].
Type: **New Zealand.** South Island. *Canterbury:* Betwixt Hill, growing over tufts of moss on soil, February 1958, *L. Visch B33* (FH! – holotype; OTA 057237! – isotype [the OTA isotype sent to James Murray by Max Visch has the following annotation in Murray's hand "Hill betwixt, 2/58 B33 subalp. On mosses etc. thallus K+ y, cortex 70 µm thick, thec. 65 µm, hypothec. 110–130 µm, sp. 11–14 × 6.5–8 µm"]).
= *Lecanora parmelinoides* Lumbsch in H.T. Lumbsch, G.B. Feige & J.A. Elix, *Bot. Acta* **107**: 34 (1994).
Type: New Zealand. South Island. *Otago*: Strachan Creek Ridge, Burke [Valley], 13.3.1976, *P. Child 1841* (CHR 444514! – holotype).

Illustrations: Lumbsch *et al.* (1994a: 33, fig. 1D – as *Lecanora parmelinoides*); Lumbsch (1994: 122, fig 65A, B – as *L. parmelinoides*); Guderley (1999: 214, fig. 20F; 218, fig. 21A – as *L. parmelinoides*); Øvstedal & Lewis-Smith (2001: 213, fig. 30 – as *L. parmelinoides*).
Description: Thallus crustose, uniform, adnate, verrucose to verrucose-areolate or subsquamulose, whitish grey to bluish grey with or without a sparse bluish pruina. Soredia absent. Margins slightly effigurate. Prothallus not visible. Areolae 0.5–1.5 mm diam., in section to 0.8 mm thick, plane to subbullate. Apothecia sessile, 0.9–3.0 mm diam., discs dark red-brown to brown-black, intense dark red-brown when wet, bluish grey-pruinose. Apothecial margins bluish grey, thin, entire ± verrucose to crenulate. Cortex indistinct, hyaline, inspersed with small crystals, 30–50 µm laterally and 45–75 µm at base, uniform. Amphithecium with small crystals (Pd+) dissolving rapidly in K (*L. allophana*-type). Parathecium hyaline, without crystals (Pd–), 10–15 µm thick. Epithecium red-brown, 10–15 µm thick, unchanged in K, with small crystals on the hymenium (Pd+), crystals rapidly dissolving in K. Hymenium hyaline, 60–80 µm tall. Hypothecium and subhymenium hyaline. Paraphyses to 2 µm thick, septate, apically ramifying and slightly thickened. Asci clavate 45–60 × 12–16 µm. Ascospores ellipsoid 11.5–15.5 × 5.5–8.5 µm.
Chemistry: Thallus and apothecial margins K+ yellow, C+ orange, KC+ orange Pd+ yellowish orange; Major compounds: atranorin, ± chloroatranorin, ± asemone, ± 5,7,-dichloro-3–*O*-methylnorlichexanthone, ± thiophanic acid and ± 2,5,7,-trichloro-3–*O*-methylnorlichexanthone: Minor compounds: ± chloroatranorin, arthothelin, 7-chloronorlichexanthone, 2,5-dichloronorlichexanthone, 2,7-dichlorolichexanthone, ± 5,7-dichloro-3-*O*-methylnorlichexanthone, 5,7-dichloronorlichexanthone, isoarthothelin, 3-*O*-methylasemone, ± 2,5,7-trichloro-3-*O*-methylnorlichexanthone, 2,5,7-trichlorolichexanthone (Lumbsch *et al.* 1994a).

Distribution. *Nelson:* St Arnaud Range. *Marlborough:* Seaward Kaikoura Range. *Westland:* Otira Gorge. *Canterbury*: Mt Technical near Lewis Pass, Arthur's Pass, near Cass, Craigieburn Range, Porter's Pass, Mt Wakefield, Mt Sebastopol, Mt Peel. *Otago*: Burke Valley near Haast Pass, Park Pass, Theatre Flat, Rockburn, Old Man Range, Dunstan Mountains, Pisa Range, Umbrella Mountains. *Southland*: West Dome, Lake Roe, Fiordland. *Campbell Island*: Mt Honey. Amongst moss and soil in fellfield, scree, rock bluffs and alpine herbfield. Known also from Australia (New South Wales, Australian Capital Territory, Tasmania), Tierra del Fuego, the South Orkey Islands and South Shetland Islands (Lumbsch 1994, Lumbsch *et al.* 1994b, Guderley 1999, Øvstedal & Lewis-Smith 2001, Calvelo & Liberatore 2001, McCarthy 2002).

Notes: *Lecanora lugubris* is very similar to *L. elixii* Lumbsch (Lumbsch & Feige 1994), a saxicolous species having a similar chemistry and thallus structure and habit, although with slight differences in both chemistry and ascospore size. It seems likely to me that the two will prove to be conspecific (in which case *L. lugubris* will have precedence), but pending further collections of *L. elixii* to resolve the constancy of the small differences observed between it and *L. lugubris*, the two taxa are maintained as distinct entities.

SPECIMENS EXAMINED
Nelson: •Parachute Rocks, St Arnaud Range, 18.xi.1977, *D.J. Galloway s.n.* (CHR 240700). *Marlborough:* •Seaward Kaikoura Range, Mt Fyffe, soil in rock crevice, 1502 m, 30.x.1993, *B. Polly s.n.* (WELT L 4395). *Westland:* •Upper Otira Valley, xi.1972, *D.J. Galloway s.n.* (CHR 345835). *Canterbury:* •Slopes of Mt Technical

above Lewis Pass, in alpine grassland, 14.i.1979, *D.J. Galloway s.n.* (CHR 485861); •Broken River Ski Basin, in alpine *Chionochloa pallens–C. macra* grassland, bird-perch rock in scree, 1500 m, 4.xi.1989, *A.J. Fife 9396* (CHR 477248); •Porter's Pass, soil in rock crevice, S aspect, 26.i.1985, *C.D. Meurk s.n.* (CHR 543845); •Foggy Peak, Torlesse Range, xi.1972, *D.J. Galloway s.n.* (CHR 345837); •Mt Sebastopol, 22.i.1972, *D.J. Galloway 2188* (CHR 260576); •Mt Peel, c. 1523 m, i.1972, *D.J. Galloway s.n.* (CHR 485906); •Te Huruhuru, Hunters Hills, on soil and moss in rock crevices, 1100 m, 26.iii.1978, *D.J. Galloway s.n.* (CHR 266906). *Otago:* •Park Pass, 1350 m, 19.ii.1968, *D.J. Galloway s.n.* (CHR 345834). *Southland:* •around Lake Roe, Merrie Range, 800–1200 m, 26.xii.1997, *A. Knight s.n.* (OTA 049591). *Campbell Island:* •E Honey Summit, 517 m, rock bluffs, N aspect, 12.ii.1985, *C.D. Meurk s.n.* (CHR 543544).

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Additional lichen records from New Zealand 37. *Candelariella subdeflexa* (Nyl.) Lettau

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Abstract: *Candelariella subdeflexa* (Nyl.) Lettau is reported as new to New Zealand and the Southern Hemisphere.

During a revision of corticolous species of *Catillaria sensu lat.* for the forthcoming *Supplement* to *Flora of New Zealand Lichens* (Galloway 1985), a rather odd form of what was provisionally named *Catillaria kelica* was collected from bark of *Sophora microphylla* in grassland in Central Otago. Closer examination of this showed it to be within the range of variation of the Northern Hemisphere species *Candelariella subdeflexa*. This is a major extension to the known range of this species and an addition to New Zealand's mycobiota.

Candelariella subdeflexa (Nyl.) Lettau, *Hedwigia* **52**: 196 (1912)
≡ *Lecanora subdeflexa* Nyl. *Flora* **62**: 355 (1879).

Type: "Corticola in Gallia", *sine loco, sine collectoribus* (Nylander 1879: 355) (H-NYL – not seen [Hakulinen (1954: 61) lists Nylander numbers of H-NYL 29171–29173 as possible types. However, in the same paragraph he mentions that H-NYL 29173 represents a collection from Spain made by Weddell in 1871, which would exclude this specimen from the list of possible types]).

Illustration: Hakulinen (1954: 25, tab. 1, fig. 13).

Description: Thallus irregularly spreading, 1–3(–5) cm diam., effuse, granular or minutely papillate, roughened, not smooth or shining, areolate-cracked, dull olive-green to greenish grey, rarely pale grey, without isidia or soredia. Apothecia common, widely scattered to crowded, solitary or 2–3 together, round to irregular or deformed through mutual pressure, 0.1–0.3(–0.5) mm diam., sessile, adpressed, not constricted at base, plane to shallowly convex, immarginate, disc smooth, matt, bright, clear yellow at first becoming yellow-brown centrally in mature discs, occasionally minutely yellow-pruinose (10× lens). Epithecium yellow, densely granular, 8.5–15 µm thick, pigment darkening to olive-brown in K, the granules dissolving. Hymenium colourless to very pale straw-yellow in K, inspersed with oil droplets, 65–85 µm tall. Paraphyses simple, septate, apices not noticeably thickened. Hypothecium hyaline, densely interwoven, 130–150 µm thick. Asci clavate 30–38 × 8.2–13 µm, 8-spored, ascus wall with apical thickening, broad ocular chamber and broad axial body and pattern of reaction with Lugol's iodine, as typical for the genus. Ascospores oblong-ellipsoid, slightly curved, colourless, simple with 2–3 large vacuoles or with a very thin septum and 2–3 vacuoles, 13–16(–17.5) × 4–5.5 µm. [Hakulinen (1954) gives (9–)12–18(–21) × 4–6 µm, with a mean value of 13 × 4.5 µm; Poelt & Vězda (1977) give the range as 12–18 × 4–6 µm; Clauzade & Roux (1985) cite the range as 9–21 × 4–6 µm; and Wirth (1995) gives 11–18 × 3.5–5.5 µm].
Chemistry: Thallus and apothecia K–, C–, KC–, Pd–; apothecia containing calycin and pulvinic dilactone; thallus without pulvinic acid derivatives.

Notes: Candelariella subdeflexa is characterized by the rather insignificant scurfy, granular-effuse, olive-green to greenish grey, areolate thallus (lacking pulvinic acid derivatives) which is neither isidiate nor sorediate, and the prominent, yellow to yellow-brown, immarginate, sessile but adpressed apothecia (K–), with 8-spored asci containing simple (vacuolate) to 1-septate ascospores, (13.5–)15–17.5 × 5–7.5 µm.

In many European specimens of this species, thallus colour varies from grey to dark grey, whereas in the Otago collection, only some marginal thalline granules are pale grey, with the rest being olive-green to grey-green. The thallus lacks pulvinic acid derivatives, unlike other members of the genus in New Zealand that are yellow and contain pulvinic acid derivatives (viz.: *C. aurella, C. coralliza, C. reflexa, C. vitellina* and *C. xanthostigma*). European species of *Candelariella* having a grey thallus and lacking pulvinic acid derivatives include the saxicolous taxa *C. deflexa* (Nyl.) Zahlbr., *C. oleaginescens* Rondon, and *C. plumbea* Poelt & Vězda (Poelt & Vězda 1977), and the corticolous species *C. viae-lacteae* G. Thor & V. Wirth (Wirth 1995). Development of thalline granules is apparently rather variable in *C. subdeflexa*, with Hakulinen (1954) interpreting these as a prothallus, with a true thallus being absent, and both Poelt & Vězda (1977), and Clauzade & Roux (1985) follow this interpretation.

To date the sole New Zealand collection of *C. subdeflexa* is from the eutrophicated basal trunks of isolated *Sophora microphylla* trees in pastureland on NE-facing slopes of Mt Benger in the Teviot Valley, Central Otago. It is common and well-developed in this habitat, being the major lichen epiphyte close to ground level at a site much used by sheep as a camping spot, and hence with high levels of ammonia and other nutrients. However, it is still very imperfectly known in New Zealand and is much in need of further collections here.

Caloplaca subdeflexa occurs on the eutrophic or nutrient-enriched bark of isolated or wayside trees of *Acer, Cupressus, Fraxinus, Juglans, Malus, Populus, Tilia* and *Ulmus* in Central and Southern Europe (Hakulinen 1954, Lettau 1956, Poelt 1964, Nimis 1993, Scholz 2000, Hafellner & Türk 2001, Llimona & Hladun 2001, and specimens in GZU), and is also recorded from North America (Esslinger & Egan 1995), North Africa and Asia (Hakulinen 1954).

SPECIMEN EXAMINED

Otago: •Mt Benger, E slopes, 400 m, on kowhai tree in grassland close to silver beech remnant, sheep camp, highly eutrophicated, common at base of tree, 5.i.1997, *D.J. Galloway 5203* (OTA, GZU), associating in this habitat with *Rinodina pyrina* (Mayrhofer *et al.* 1999).

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Additional lichen records from New Zealand 38. *Clypeococcum grossum* (Körb.) D. Hawksw., on nine species of *Umbilicaria*.

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Abstract: The lichenicolous fungus *Clypeococcum grossum* (Körb.) D. Hawksw. is recorded from high-alpine sites in South Island, New Zealand, for the first time on the host lichens *Umbilicaria cylindrica, U. durietzii, U. grisea, U. hyperborea, U. nylanderiana, U. polyphylla, U. subaprina* and *U. umbilicarioides*. An earlier New Zealand record from *U. vellea* is confirmed and extended. Details of the species and its known distribution in New Zealand are presented. *Clypeococcum grossum* is an addition to the bipolar element in the New Zealand mycobiota. It is not known at present elsewhere in the Southern Hemisphere.

Introduction

Clypeococcum (Hawksworth 1977) is a genus of six species included in the family Dacampiaceae (Eriksson *et al.* 2001), occurring as parasites on *Hypocenomyce scalaris* (Hawksworth 1980, Triebel 1989), *Cetrelia* and *Parmelia* (Hawksworth 1977), *Placopsis contortuplicata* (Øvstedal & Hawksworth 1986), species of *Umbilicaria* viz.: *U. arctica, U. cylindrica, U. polyphylla* and *U. vellea* (Hawksworth 1982, Øvstedal & Hawksworth 1986, Hawksworth & Diederich 1988, Alstrup & Hawksworth 1990, Santesson 1993) and on *Cetraria islandica* (Hafellner 1994). The genus differs from *Polycoccum*, where no clypeus structure is developed, and the walls of the ascomata consist of angular, compressed, pseudoparenchymatous cells ('textura angularis') and not interwoven hyphae (Hawksworth 1980). *Clypeococcum* typically forms raised circular swellings on the upper surface that eventually become globose, gall-like structures, and in heavy infections the host lichen tissue becomes necrotic and whitish.

One species, *Clypeococcum grossum* (Körb.) D. Hawksw., is known from New Zealand and was first reported there from specimens of *Umbilicaria vellea* collected on the Rock & Pillar Range (Hawksworth & Diederich 1988). During the course of a revision of *Umbilicaria* in New Zealand for the forthcoming *Supplement* to *Flora of New Zealand Lichens*, both field and herbarium studies show that additional species of *Umbilicaria* from New Zealand gatherings are hosts for *C. grossum* infection and now include *U. cylindrica, U. durietzii, U. hyperborea, U. grisea, U. polyphylla, U. subaprina, U. umbilicarioides* and *U. vellea*.

Material of *Clypeococcum*-infected *Umbilicaria* from New Zealand was earlier incorrectly designated as *Lasallia* sp. (Galloway 1985, 1992), the conspicuous superficial galls being mistaken for pustules that are a common feature of species of *Lasallia*, a genus not found in New Zealand.

Clypeococcum grossum (Körb.) D. Hawksw., *Notes RBG Edinb.* **40**, 379 (1980)
Basionym: *Tichothecium grossum* Körb, *Parerga Lich.*, 469 (1865).

Description: Ascomata developing in thalline swellings or galls on the upper surface of the host, rarely at the tips of rhizomorphs on the lower surface [observed once in a specimen of *U. umbilicarioides* (CHR 533568a)], 0.5–4.5(–6) mm diam., often forming whitish or brownish necrotic patches on the host thallus; individual perithecia numerous, crowded, often arranged in concentric circles, immersed at first, becoming globose at maturity, shining, carbonaceous-black, 0.05–0.1 mm diam., with a central depressed ostiole. Ascospores dark olive-brown, one cell larger and slightly more swollen than the other, slightly constricted at septum, (13.5–)15–16.5(–18.2) × 7–8.5(–9) µm, walls delicately verrucose.

Hosts: Umbilicaria arctica, U. cinerascens, U. cylindrica, U. durietzii, U. grisea, U. hyperborea, U. nylanderiana, U. polyphylla, U. subaprina, U. umbilicarioides, U. vellea.

Notes: The lichenicolous fungus *Clypeococcum grossum* forms circular swellings to conspicuous, globose galls (reminiscent of pustules in *Lasallia*) on the upper surface of the host lichen, up to 6 mm diam., with a characteristic, rounded depression visible on the lower surface.

Outside of New Zealand, *Clypeococcum grossum* is known from Svalbard (on *Umbilicaria cylindrica*), Norway (on *Umbilicaria arctica*), Greenland (on *Umbilicaria cylindrica* and *U. vellea*), central Spain (on *Umbilicaria cinerascens*) and from British Columbia (on *Umbilicaria polyphylla*) (Hawksworth 1982, Hafellner & Sancho 1990, Alstrup & Hawksworth 1990, Santesson 1993, Alstrup & Elvebakk 1996). It is not known from Australia (McCarthy 2001), Chile (Galloway & Quilhot 1999) or Argentina (Calvelo & Liberatore 2001), but should be searched for on species of *Umbilicaria* in these regions. *Clypeococcum grossum* can therefore be added to the list of bipolar lichens and lichenicolous fungi occurring in the mountains of southern New Zealand (Galloway & Aptroot 1995, Galloway 1999).

SPECIMENS EXAMINED

Umbilicaria cylindrica (L.) Delise ex Duby: *Otago*: •Old Man Range, S end, Skier's Rock on schist rock in grassland, 1280 m, 26.ii.1998, *D.J. Galloway 217a* (OTA).

Umbilicaria durietzii Frey: *Canterbury*: •Kea Point, Mt Cook [National Park], not common – on old moraine boulders, 912 m, 24.xii.1970, *P. Child 1205* (CHR 423170).

Umbilicaria grisea Hoffm.: *Otago:* •Poolburn Reservoir, large schist outcrop near Gut, N facing ledges in full sun, periodically wetted by draining water, 840 m, 2.v.2000, *D.J. Galloway 5201* (CHR 533382); •Flagstaff Hill, Dunedin, rare on rocks W of summit, 666 m, 6.i.1995, *D.J. Galloway 5216* (OTA)

Umbilicaria hyperborea (Ach.) Hoffm.: *Marlborough*: •Acheron River, Molesworth, 1.iv.1949, *H.H. Allan s.n.* (CHR 98014). *Otago*: •Manorburn Reservoir, schist rock in depleted grassland, 760 m, 8.i.2002, *D.J. Galloway 5395* (CHR 533535); •*ibid.*, large schist outcrop on top of hill above lake, 880 m, 8.i.2002, *D.J. Galloway 5402* (CHR 533542); •near Butcher's Dam, Alexandra, on sloping surfaces on S side of schist rocks, 30.xii.1963, *W Martin 5751* (OTA 057055).

Umbilicaria nylanderiana (Zahlbr.) H. Magn.: *Nelson*: •St Arnaud Range, summit, on rock, 1685 m, 18.xi.1977, *D.J. Galloway s.n.* (CHR 266695).

Umbilicaria polyphylla (L.) Baumg.: *Otago:* •Poolburn Reservoir, tops of schist outcrops, 858 m, 6.x.1998, *D.J. Galloway 5214* (OTA); •*ibid.*, on sunny tops of large schist tor on top of ridge above reservoir, 900 m, 22.xii.2001, *D.J. Galloway 5215* (OTA); •Old Man Range, above Omeo Creek, SE aspect, schist tors 1066 m, 14.viii.1970, *P. Child 672* (CHR 444525); •Mt Benger, head of Black Jack's Creek on W-facing sides of schist tors, 1080 m, 27.i.1997, *D.J. Galloway 96/235* (OTA);

•Lamb Hill, on rock, *J.S. Thomson T 238* [V 142] (CHR 160043); •Silver Peak summit, 777m, iii.1959, *J. Murray 4291* (OTA 057070); •Flagstaff, 668 m, x.1957, *J. Murray 1165 & G.A. Llano* (OTA 057065); •Mt Cargill, rock in *Dracophyllum* scrub, 300 m, 17.xi.1998, *B. Polly s.n.* (WELT L 006032); •Maungatua, 885 m, ii.1961, *J. Murray 5710* (OTA 057067).

Umbilicaria subaprina Frey. *Otago:* •Mt Head, Forbes Range, on summit rocks, 2550 m, 22.i.1971, *P. Child 1348* (CHR 527925); •Mt Minos, Humboldt Mountains, 2012 m, 1.i.1970, *D.J. Galloway 68420* (CHR 378719).

Umbilicaria umbilicarioides (B. Stein) Krog & Swinscow: *Otago:* •Old Man Range, S end, Skier's Rock, on exposed tops of schist tors and outcrops, 1280 m, 26.ii.1998, *D.J. Galloway 0217* (OTA); •Mt Benger, head of Black Jack's Creek on schist tors and outcrops, 1080 m, 27.i.1997, *D.J. Galloway 5209* (OTA).

Umbilicaria vellea (L.) Hoffm.: *Canterbury:* •Hunters Hills, between Mt Nimrod and "Stick Hill", 21.iii.1980, *D.R. Given s.n.* (CHR 385780); •Kirkliston Range, on rock outcrops and scattered boulders on wide summit plateau, 1433 m, 25.iii.1978, *D.J. Galloway 5207* (CHR 533388). *Otago:* •Corner Peak, Lake Hawea, on summit rock (the only one seen) 1661 m, 6.ii.1985, *P. Child 2119* (CHR 423163); •Poolburn Reservoir, E side, on vertical to overhanging E-faces of schist tors in grassland, 890 m, 6.i.2001, *D.J. Galloway 5210, 5212* (OTA); •Manorburn Reservoir, large schist outcrop on top of hill above lake, 880 m, on vertical, S-facing slopes, 8.i.2002, *D.J. Galloway 5398* (CHR 533538); •Old Man Range, above Conroy's [Gully], on outcrops and tors 1372 m, 9.viii.1970, *P. Child 645* (CHR 423157); •Old Man Range S end, ski bivvy tor, on schist tors, 1218 m, 15.xii.1970, *P. Child 1155* (CHR 523158); •Rock & Pillar Range, on Castle Rock, 1372 m, 14.ii.1971, *J. Child 1237* (CHR 384489); •N Rock & Pillar Range, on tors, 1205 m, 28.viii.1977, *P. Child 1877* (CHR 423159); •Mt Benger, head of Black Jack's Creek, vertical sides of schist tors, 1080 m, 27.i.1997, *D.J. Galloway 96194* (OTA); •Maungatua summit, 895 m, iii.1966, *D.J. Galloway s.n.* (CHR 376664).

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Additional lichen records from Oceania 8. Some corticolous and saxicolous pyrenolichens from the Solomon Islands

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Abstract: Sixteen corticolous and saxicolous pyrenocarpous lichens are reported for the first time from the Solomon Islands in the south-western Pacific Ocean.

Introduction

In 1965 the Royal Society undertook an expedition to the Solomon Islands in the south-western Pacific Ocean. Many lichen specimens were collected in Kolombangara and Santa Isabel Islands by David J. Hill and were later deposited in the Natural History Museum, London (BM).

The lichens of Solomon Islands are poorly documented, with only 60 taxa listed by Elix & McCarthy (1998). Among the better-known elements of the flora are Parmeliaceae (Elix & Glenny 1996), *Pseudocyphellaria* (Galloway 1994) and Thelotrematceae (Hale 1978, 1981); the perithecioid genus *Melanophloea* (Thrombiaceae) was described from Hill's collections by James & Vězda (1971). Although no pyrenocarpous taxa have been reported from the islands, an examination of 83 Hill specimens borrowed from BM resulted in the recognition of 16 corticolous and saxicolous species of Myeloconaceae, Pyrenulaceae, Strigulaceae, Trichotheliaceae and Trypetheliaceae; the records of *Myeloconis fecunda*, *Porina crassa* and *Pyrenula flagellata* are of particular interest (see below). A further 15–20 species (mostly Pyrenulaceae) remain unidentified among the Hill collections.

The Species

Laurera meristospora (Mont. & Bosch) Zahlbr., *Cat. Lich. Univ.* **1**, 505 (1922)
This is a common corticolous lichen in much of the eastern Palaeotropics.

SPECIMEN EXAMINED
Kolombangara I.: •ridge W of Kolombangara R., alt. 2500 feet [820 m], on bark, *Hill 10707* (part), 7.ix.1965.

Myeloconis fecunda P.M. McCarthy & Elix, *Lichenologist* **28**, 409 (1996)
Already known from rainforest in Sarawak (Malaysia) and the Guianas, *M. fecunda* produces large, appressed, brownish thalli with a medulla dominated by orange crystals. The perithecia are immersed with a distinctly concave apex, the asci are uniformly thin-walled, and the colourless, elongate, muriform ascospores are more than 200 µm long (McCarthy & Elix 1996). The usually sterile *M. erumpens* P.M. McCarthy & Elix with its bright yellow, powdery medulla appears to be more common in the region, being found in Thailand, Papua New Guinea, north-eastern Queensland and New Caledonia.

SPECIMENS EXAMINED
Kolombangara I.: •W side of ridge W of Kolombangara R., alt. 2000–2500 feet [656–820 m], on bark, *Hill 10660, 10663, 10666*, 5.ix.1965.

Porina crassa P.M. McCarthy, *Bibliotheca Lichenologica* **52**, 41 (1993)
This species was previously known from deeply shaded, siliceous rock in the Atherton Tableland, north-eastern Queensland. Australian specimens have an exceptionally thick thallus and immersed perithecia with a usually plane apex

that is flush with the thallus (McCarthy 1993); the small ascospores are 7-septate. The collections listed below have a somewhat thinner thallus, and while most perithecia are similarly immersed, some are more prominent and are visible as glossy, orange-brown protuberances.

SPECIMENS EXAMINED
Santa Isabel I.: •Thousand Ships Bay, head of Mindoro Bay, on siliceous rock in forest, *Hill 10873* (part), *10884*, 21.ix.1965.

Porina internigrans (Nyl.) Müll. Arg., *Rep. Meetings Australas. Assoc. Advancem. Sci.* **1895**, 452 (1895)
This Palaeotropical corticolous lichen is known from the Andaman Islands, South-east Asia, New Guinea, eastern Queensland, Vanuatu and New Caledonia.

SELECTED SPECIMENS EXAMINED
Kolombangara I.: •ridge W of Kolombangara, alt. 2600–2800 feet [853–919 m], on bark, *Hill 10519*, 3.ix.1965. *Santa Isabel I.*: •W head of Tatamba Bay, on bark in coastal forest, *Hill 11065*, 1.x.1965.

Porina mastoidea (Ach.) Müll. Arg., *Bot. Jahrb. Syst.* **6**, 399 (1885)
Porina mastoidea is a common pantropical lichen.

SELECTED SPECIMENS EXAMINED
Kolombangara I.: •2–4 miles [3.2–6.5 km] inland from mouth of Kolombangara R., on twigs in lowland rainforest, *Hill 10459* (part), 27.viii.1965. *Santa Isabel I.*: •along stream, 1 mile [c. 0.6 km] NW of Tatamba, on twigs in lowland rainforest, *Hill 11235*, 5.x.1965.

Porina mastoidella (Nyl.) Müll. Arg., *Bot. Jahrb. Syst.* **6**, 401 (1885)
First described from India, *P. mastoidella* has recently been reported from Christmas Island (Indian Ocean) and Vanuatu.

SPECIMENS EXAMINED
Kolombangara I.: •2–4 miles [3.2–6.5 km] inland from mouth of Kolombangara R., on twigs in lowland rainforest, *Hill 10459* (part), 27.viii.1965. *Santa Isabel I.*: •Thousand Ships Bay, head of Mindoro Bay, on bark in forest, *Hill 10894*, 21.ix.1965.

Porina papuensis P.M. McCarthy, *Bibliotheca Lichenologica* **52**, 86 (1993)
This species is known from calcareous and siliceous rock in Papua New Guinea, Christmas Island and Micronesia.

SPECIMENS EXAMINED
Santa Isabel I.: •Thousand Ships Bay, on limestone in forest at head of Mindoro Bay, *Hill 10875, 10876*, 21.ix.1965.

Porina tetracerae (Ach.) Müll. Arg., *Bot. Jahrb. Syst.* **6**, 401 (1885), var. **tetracerae**
This is a common pantropical lichen on bark and rock.

SPECIMEN EXAMINED
Kolombangara I.: •2 miles [c. 3.2 km] up Kolombangara R., on bark in lowland rainforest, *Hill 10448*, 25.viii.1965.

Pyrenula anomala (Ach.) Vain., *Ann. Acad. Sci. Fenn., Ser. A* **6**(7), 189 (1915)
This is a common pantropical and subtropical species.

SELECTED SPECIMENS EXAMINED
Santa Isabel I.: •Thousand Ships Bay, Kockatoo Anchorage, ridge on mainland, *Hill 10821, 10861, 10864*, 20.ix.1965.

Pyrenula aspistea (Ach.) Ach., *Syn. Meth. Lich.*: 123 (1814)
This pantropical lichen is most common in Africa, SE Asia, Malesia and the Pacific.

SPECIMENS EXAMINED
Kolombangara I.: •ridge W of Kolombangara, alt. c. 2500 feet [820 m], on bark, *Hill 10596*, 3.ix.1965. *Santa Isabel I.:* •Tatamba, coastal forest, *Hill 11004*, 28.ix.1965.

Pyrenula concatervans (Nyl.) R.C. Harris, in Tucker & Harris, *Bryologist* **83**, 15 (1980)
This is a lowland pantropical lichen.

SPECIMEN EXAMINED
Santa Isabel I.: •Thousand Ships Bay, ridge above Vulavu village, alt. 500–1000 feet [164–328 m], on bark, *Hill 11220* (part), 7.x.1965.

Pyrenula flagellata Harada, *Bryologist* **96**, 635 (1993)
Previously known only from Saipan in Micronesia, *P. flagellata* has a whitish to partly orange-red, K+ purple thallus and prominent, 0.3–0.5 mm diam. perithecia. The ascospores are especially distinctive, being fusiform, very pale brown, 7-septate with a body 20–35 × 4–6 µm and a flagellum-like extension 8–15 µm long at the proximal end (Harada 1993).

SPECIMEN EXAMINED
Santa Isabel I.: •Tanabuli L., near Tatamba, on *Cocos*(?) bark, *Hill 11053* (part), 29.ix.1965.

Pyrenula parvinuclea (Meyen & Flot.) Aptroot, in Aptroot *et al.*, *Bibliotheca Lichenologica* **64**, 165 (1997)
This is a coastal Palaeotropical species.

SPECIMEN EXAMINED
Santa Isabel I.: •Tanabuli I., near Tatamba, on bark, *Hill 11055*, 29.ix.1965.

Strigula bermudana (Tuck. ex Nyl.) R.C. Harris, *Some Florida Lichens*: 155 (1995)
This very inconspicuous calcicolous lichen was first described from the Caribbean and recently reported and illustrated from Christmas Island in the Indian Ocean (McCarthy 2001).

SPECIMEN EXAMINED
Santa Isabel I.: •Thousand Ships Bay, on limestone in forest at head of Mindoro Bay, *Hill 10873* (part), 21.ix.1965.

Strigula concreta (Fée) R. Sant., *Symb. Bot. Upsal.* **12**(1), 177 (1952)
This almost pantropical and almost invariably foliicolous lichen was collected from the thin, peeling bark of twigs.

SPECIMEN EXAMINED
Santa Isabel I.: •Thousand Ships Bay, in forest at head of Mindoro Bay, on bark, *Hill 10901*, 21.ix.1965.

Trypethelium variolosum Ach., *Syn. Meth. Lich.*: 104 (1814)
The distribution of this pantropical lichen already includes north-eastern Australia and Vanuatu.

SPECIMENS EXAMINED
Kolombangara I.: •ridge W of Kolombangara R., alt. 2500 feet [820 m], on bark, *Hill 10707* (part), 7.ix.1965. *Santa Isabel I.:* •Tanabuli I., near Tatamba, on bark, *Hill 11037*, 29.ix.1965.

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15TH MEETING OF AUSTRALASIAN LICHENOLOGISTS

The 15th meeting of Australasian lichenologists, at Blackheath, was a social occasion as well as a chance to discuss lichenology. The 18 attending came from as far afield as London, Tasmania and Queensland.

After David Eldridge welcomed the group, Tim Entwistle opened the meeting with a discussion of cryptogamic research in Australia and the pressing need for more staff. Simone Louwhoff, fresh from her new position at the Natural History Museum of London, presented two talks, one on *Hypotrachyna* and allied genera in Papua New Guinea, and the other on William Purvis' study of the impact of atmospheric pollution on London's lichen flora. The theme of lichen ecology continued with talks by Sharon Ford on the effects on lichen populations of rainforest stand-age and size and by Will Cuddy on soil crust lichens as bioindicators in the inland slopes of NSW. Gintaras Kantvilas spoke on the conservation of Tasmanian Parmeliaceae.

As is traditional, the afternoon discussions were more general and included talks on progress with ABRS' Flora of Australia publications (Pat McCarthy), how to deal with backlogs in herbaria (Simone Louwhoff), and threatened lichen species in Australia (David Eldridge). The venue for the 16th meeting in 2004 will be either Armidale in NSW or Adelaide. In the evening, the group met at a local pub for a meal and drinks. Everybody was impressed by Gintaras' culinary knowledge and his ability to extract a free bottle of wine from the management.

The weather for the Sunday fieldtrip was magnificent despite predictions of rain. We met at Evans Lookout and proceeded down a track leading from dry sandstone through dry sclerophyll and wet sclerophyll to temperate rainforest. The collectors were well rewarded, with some getting barely 50 m along the track. The sandstone rock ledges were excellent habitat for *Hypogymnia, Hypotrachyna, Parmelinopsis, Usnea* and even a new *Siphula*. After visiting the renowned Blackheath bakery for lunch, we carried on to rainforest at Mount Wilson and collected during the constant threat of showers. Contact Alan at alanw.archer@bigpond.com for a list of species recorded on the day. *David Eldridge*

In front: Bronwyn Myall, Sharon Ford, and Rowena Whiting. Behind from left: Jack Elix, Bob Coveny, Gordon Myall, Gintaras Kantvilas, Nell Stevens, Patrick McCarthy, Neville Stevens, Val Stajsic, Simone Louwhoff, Mary Gibson, Will Cuddy, Bernadette Sinclair, and Eric Whiting. Not shown: David Eldridge and Tim Entwistle.

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