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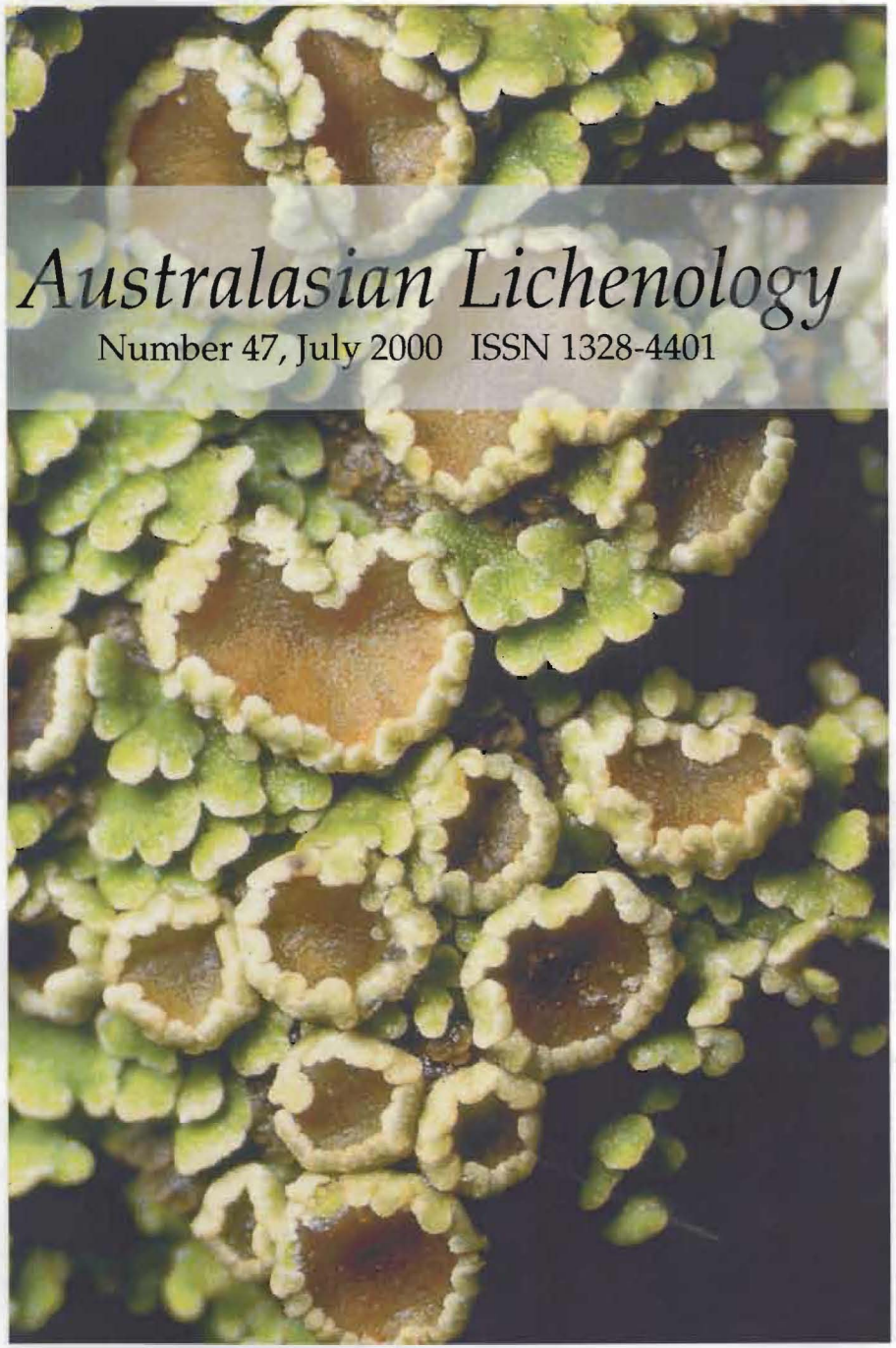

14th Meeting of Australasian Lichenologists—Melbourne, 29–30 April, 2000

Minutes:

Present: Alan Archer, David Eldridge, Jack Elix, Sharon Ford, Bruce Fuhrer, Jim Gardner, Gintaras Kantvilas, Niels Klazenga, Simone Louwhoff, Dorothy Mahler, Tom May, Pina Milne, Martine Paull, Kathleen Ralston, Noel Schleiger, Val Stajsic, Nell and Neville Stevens, with a special welcome to Jennifer Bannister who joined us all the way from Dunedin, New Zealand.

Talks: Dr. Tom May of the Melbourne Herbarium opened the meeting with a warm welcome, and introductory remarks by Prof. Jack Elix followed. Talks given on Saturday were many and varied and included an examination of "Victorian rainforest lichens" (S. Ford), "Why are lichens coloured?" (J. Elix), "Ramalinas of New Zealand" (J. Bannister) and an historical account of "Australia's pioneer Lichenologist, Rev. F.R.M. Wilson" (K. Ralston). A conservation theme followed, with G. Kantvilas discussing "Conservation of Tasmanian Lichens" and D. Eldridge talking on "A proposal for listing non-vascular plants on the Threatened Species Conservation Act". To finish we saw a slide presentation of new Graphidaceae (A. Archer), and S. Louwhoff became the envy of many with an account of her trip to the beautiful and unusual island of New Caledonia—"In search of Parmeliaceae and Croissants in New Caledonia".

The meeting that followed included a brief discussion on the forthcoming *Flora of Australia*. Further talk on the Threatened Species Conservation Act (TSCA) was initiated by David, in particular the need to improve the profile of non-vascular plants in general, and the listing of some threatened lichens under the TSCA in N.S.W. A subcommittee was formed comprising Jack Elix (ANU), David Eldridge (Land and Water Conservation) and Gintaras Kantvilas (Tasmanian Herbarium) to prepare a submission for listing some species under the N.S.W. legislation. It was also hoped that the general profile of non-vascular groups, including lichens, fungi and bryophytes, might be raised to encourage further research. There was also some discussion on the future direction of ABRS and the potential for grants to be made available for Post-Doctorate projects of a taxonomic nature.

Dinner: The evening meal was held at the Cotton Lounge on Toorak Road, South Yarra. A lovely meal and enjoyable evening was had by all who attended.

Sunday Field Trip: A total of 20 people joined the Sunday field trip to the Brisbane Ranges, western Victoria, despite a rainy start to the day. The rain actually proved to be a great asset, as the lichens from this dry-sclerophyll forest were green and lush in their hydrated state. A number of stops were made throughout the National Park for collection. Kathleen Ralston's list of lichens for the Brisbane Ranges was increased significantly. Brave lichenologists soldiered on through drizzle and rain, followed by more drizzle. A late lunch was enjoyed at Anakie Gorge picnic area, and after much chatter and socializing, we headed back to Melbourne...with sunshine all the way!

Thanks went to the organisers, Kathleen Ralston and Sharon Ford, and to Mrs. Jenny Ford for providing the lovely picnic lunch for the Sunday Field trip.

Next Meeting: the next meeting (in 2002) will be organised by Alan Archer and David Eldridge in consultation with Jack Elix. The venue, to be confirmed at a later date, will be in either the Blue Mountains or at Orange, New South Wales.

Those who attended Saturday's meeting, from left at the back: Jennifer Bannister, Noel Schleiger, Dorothy Mahler, Nell Stevens, Neville Stevens, Alan Archer, Jack Elix, Gintaras Kantvilas, Simone Louwhoff, Tom May, Niels Klazenga, and in front: David Eldridge, Val Stajsic, Kathleen Ralston, Sharon Ford and Jim Gardner. Photograph by Bruce Fuhrer.

Request for fresh specimens of *Xanthoria*

Professor Rosmarie Honegger (University of Zürich) would be very grateful for fresh specimens of Australasian *Xanthoria* (no older than 3–5 months) for culturing and DNA extraction. Her graduate student Sandra Scherrer has already successfully isolated and characterized a hydrophobin gene from *X. parietina* and homologous sequences coding for hydrophobins in other *Xanthoria* species, and wishes to investigate further the population genetics of the genus. If you can provide specimens, air-mail them to Professor Rosmarie Honegger, University of Zürich, Institute of Plant Biology, Zollikerstr. 107, CH–8008 Zürich, Switzerland. You can contact her by **phone** at +41–1–634–8243, by **fax** at +41–1–634–8204, and by **e-mail** at rohonegg@botinst.unizh.ch

cover illustration

The mainly austral genus *Psoroma* includes about 50 species, with over half of them found in New Zealand. The australasian *P. caliginosum* occurs throughout the country on the bark of trees and shrubs to 1500 m elevation.

Archer, AW; Elix, JA (1999): Three new species in the Australian Graphidaceae with novel chemistries: *Phaeographina echinocarpica, Phaeographis necopinata,* and *Phaeographis nornotatica. Mycotaxon* **723**, 91–96.

Arup, U; Mayrhofer, H (2000): *Caloplaca erecta*, a new subfruticose species from New Zealand. *Lichenologist* **32**, 359–363.

Elix, JA (1999): Detection and identification of secondary lichen substances: contributions by the Uppsala school of lichen chemistry. *Symbolae Botanicae Upsalienses* **32**, 103–121.

Elix, JA (1999): New species of *Neofuscelia* (lichenized Ascomycotina, Parmeliaceae) from the Southern Hemisphere. *Mycotaxon* **71**, 431–456.

Elix, JA; Kantvilas, G (1999): Two new species of *Xanthoparmelia* (Ascomycotina, Parmeliaceae) from Australasia. *Mycotaxon* **71**, 89–93.

Elix, JA; Wardlaw, JH (1999): The structure of chalybaeizanic acid and quaesitic acid, two new lichen depsidones related to salazinic acid. *Australian Journal of Chemistry* **52**, 713–715.

Ford, SE (1998): Lichens of Mount Buffalo National Park: a preliminary report. *The Victorian Naturalist* **115**, 210–214.

Ford, SE; May, T (1998): *A cryptogamic extravaganza. Report of the FNCV expedition, 22-25 May, 1998, to commemorate the centenary of Wilson's Promontory National Park.* Field Naturalists Club of Victoria.

Galloway, DJ (2000): The identity of *Sticta livida* Kremp. *Lichenologist* **32**, 197–200.

Galloway, DJ (2000): *Knightiella* belongs in *Icmadophila* (Helotiales: Icmadophilaceae). *Lichenologist* **32**, 294–297.

Henssen, A (2000): *Santessoniella rosettiformis*, a new species from South America with notes on *S. pulchella* (Pannariaceae). *Lichenologist* **32**, 57–65.

Henssen, A; Kantvilas, G (2000): *Santessoniella rugosa* (Pannariaceae), a new species from Tasmania. *Lichenologist* **32**, 149–153.

Jørgensen, PM; Kantvilas, G; Galloway, DJ (2000): Three new species in the lichen genus *Degelia*. *Lichenologist* **32**, 257–262.

Kantvilas, G; Vězda, A (2000): Studies on the lichen family Thelotremataceae in Tasmania. The genus *Chroodiscus* and its relatives. *Lichenologist* **32**, 325–357.

Louwhoff, SHJJ; Elix, JA (2000): The lichens of Rarotonga, Cook Islands, South Pacific Ocean II: Parmeliaceae. *Lichenologist* **32**, 49–55.

McCarthy, PM (2000): Key to the saxicolous taxa of *Porina*. *Lichenologist* **32**, 1–13.

McCarthy, PM (2000): The lichens of Rarotonga, Cook Islands, South Pacific Ocean I: pyrenocarpous taxa. *Lichenologist* **32**, 15–47.

McCarthy, PM; Kantvilas, G (2000): A new bryophilous *Porina* from Tasmania, and notes on the diversity, ecological groups and biogeographical affinities of Tasmanian Trichotheliaceae. *Lichenologist* **32**, 247–256.

McCarthy, PM; Elix, JA; Sérusiaux, E (2000): *Kantvilasia* (Lecanorales, Ectolechiaceae), a new foliicolous lichen genus from Tasmania. *Lichenologist* **32**, 317–324.

Nordin, A; Owe-Larsson, B; Elix, JA (1999): *Buellia aeroginosa*, a new Australian species with pluriseptate spores. *Mycotaxon* **71**, 399–404.

Wedin, M; Döring, H; Ekman, S (2000): Molecular phylogeny of the lichen families Cladoniaceae, Sphaerophoraceae, and Stereocaulaceae (Lecanorales, Ascomycotina). *Lichenologist* **32**, 171–187.

Trichothelium meridionale (Trichotheliaceae), a new foliicolous lichen from Tasmania

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The mainly tropical, foliicolous genus *Trichothelium* Müll. Arg. (Trichotheliaceae) differs from the more species-rich and widely distributed *Porina* Ach. in the presence of bristle-like or fin-like outgrowths from upper levels of the perithecia. Most species are rather inconspicuous, and while the genus has been most intensively collected and documented in the Neotropics (Santesson 1952, Lücking 1998), it appears to be far less common and diverse in the eastern Paleotropics.

Five species are known from eastern Australia, and two, *T. javanicum* (Schill.) Vězda and *T. nanum* Malcolm & Vězda, occur on the leaves of ferns, shrubs and trees in cool-temperate rainforest in Tasmania. Both of these taxa produce 3-septate ascospores. In this paper we describe *T. meridionale*, a new species with 7-septate ascospores which is most closely related to the mainly Neotropical *T. epiphyllum* Müll. Arg.

Trichothelium meridionale P.M. McCarthy & Kantvilas sp. nov.
Thallus foliicola, epicuticularis, tenuissimus, cinereo-viridis vel pallidoviridis. Alga ad *Phycopeltem* pertinens, sed filamentis non radiantibus. Perithecia hemispherica vel subglobosa, nigra, (0.15–)0.21(–0.29) mm diametro, setis elongatis-acutis vel ± filiformibus, plerumque nigris, 40–80(–100) µm longis, 10–20(–25) µm crassis. Asci elongati-cylindrici vel elongati-obclavati, 75–100 × 9–14 µm. Ascosporae 7-septatae, elongatae-fusiformes vel oblongae, (28–)36(–48) × (3–)4.5(–5.5) µm.

Thallus crustose, foliicolous, epicuticular, scattered and diffuse to coalescing and determinate, pale greyish green to pale green, to 20 µm thick, continuous, smooth, matt to slightly glossy, ecorticate, K–. Algae *Phycopeltis*-like; filaments loosely aggregated; branching irregular, not forming radiating plates; cells subglobose, angular-rounded or short-rectangular, 8–15 × 5–8 µm. Hyphae 1–2 µm wide. Prothallus not apparent. Basal layer absent.

Perithecia moderately numerous, scattered, superficial, hemispherical to subglobose, not, slightly or strongly basally attenuated, (0.15–)0.21(–0.29) mm diam. [n = 79] (not including setae), greenish black to jet-black, matt. Apex slightly flattened to rounded. Ostiole inconspicuous or in a hemispherical, 20–30 µm diam. papilla. Setae (0–)4–6(–12), 40–80(–100) µm long, 10–20(–25) µm thick, growing from just below the ostiole or from elsewhere in the upper one-third of the perithecium, scattered or forming a ring, narrowly acute or bristle-like, usually straight and oblique (rarely horizontal), occasionally slightly incurved, rarely slightly decurved, usually uniformly black, occasionally with a hyaline tip, very rarely uniformly hyaline, usually remaining discrete to maturity, rarely coalescing, composed of elongate, agglutinated hyphae 2(–3) µm wide. Involucrellum contiguous with and extending to the base of the excipulum, occasionally (in subglobose perithecia) incurved beneath it, uniformly 20–30 µm thick, greenish black in thin section, K–, sometimes partly or almost completely covered by a very thin layer of thallus. Excipulum greenish black, c. 15–18 µm thick. Subhymenium c. 20 µm deep. Centrum depressed-ovate or subglobose, 0.11–0.2 mm diam. Paraphyses

unbranched, 0.5–0.8 µm thick. Periphyses absent. Asci elongate-cylindrical to elongate-obclavate, 8-spored, 75–100 × 9–14 µm [n = 12], with a rounded to subtruncate apex; apical ring present. Ascospores colourless, 7-septate, elongate-fusiform or oblong, straight or slightly curved, irregularly biseriate in the asci, without a gelatinous sheath, (28–)36(–48) × (3–)4.5(–5.5) µm [n = 70]; contents clear to guttulate.

Conidiomata not seen.

Illustration: Figure 1.

Type: **Australia**: *Tasmania*: •W of Tahune Bridge, Warra SST, "Big Coupe", 43°06'S, 146°41'E, 180 m, on living fronds of *Blechnum wattsii*, *G. Kantvilas 67/00 & S. J. Jarman*, 25.i.2000 (Holo: HO 501574; iso: CANB).

Notes: The new lichen is characterized by a very inconspicuous thallus, a non-radiating photobiont, very small but prominent black perithecia with short, delicate setae and 7-septate ascospores. It is most similar to the mainly Neotropical *T. epiphyllum* and several related taxa, all of which have small to minute, blackish perithecia and elongate, 7-septate ascospores. However, they also have a radiating photobiont and broadly acute, lanceolate or fin- or brush-shaped setae (Lücking 1998). Lücking (1991, 1998) segregated populations with delicate, *T. meridionale*-like setae in a separate taxon, *T. minutum* (R. Lücking) R. Lücking; however, that species has diminutive, 0.1–0.15 mm diam. perithecia and comparatively long setae.

Variability within thalli and between adjacent colonies is usually limited to the number, length and insertion of setae. By contrast, although there is very little outward difference between the type (on *Blechnum* pinnae) and an earlier collection from the same general locality (on *Phyllocladus* cladodes; see below), there is a distinct difference in the shape and dimensions of the ascospores. The ascospores of the type are usually oblong (less commonly fusiform) and measure 28–39 × 3.5–5.5 µm; those of the smaller, non-type specimen are mostly elongate-fusiform and 30–48 × 3–5 µm.

Trichothelium meridionale grows on living fronds of the fern *Blechnum wattsii* and on cladodes of the endemic conifer *Phyllocladus aspleniifolius* in the understorey of a *Eucalyptus obliqua*-dominated wet forest in southern Tasmania. The same leaves are also colonised by several species of mosses and hepatics, as well as the lichens *Arthonia trilocularis, Porina rufula* and *P. subapplanata*. A search of a range of sites in the general locality suggests that the new species is found mainly in forest with a well-developed rainforest understorey dominated by young *Eucryphia lucida* and *Anodopetalum biglandulosum*. Nearby, where the understorey is dominated by sclerophyllous species (*Phebalium, Acacia,* and *Melaleuca*), the *Blechnum* fronds support only *Porina subapplanata*.

ADDITIONAL SPECIMEN EXAMINED

Tasmania: •Type locality, "Middle Coupe", 130 m, on cladodes of *Phyllocladus aspleniifolius*, *S.J. Jarman s.n.*, 21.vii.1998 (HO 443044).

References

Lücking, R (1991): Neue Arten foliikoler Flechten aus Costa Rica, Zentralamerika. *Nova Hedwigia* **52**, 267–304.

Lücking, R (1998): Additions and corrections to the knowledge of the foliicolous lichen flora of Costa Rica. The genus *Trichothelium* (lichenized Ascomycetes: Trichotheliaceae). *Nova Hedwigia* **66**, 375–417.

Santesson, R (1952): Foliicolous lichens I. A revision of the taxonomy of the obligately foliicolous, lichenized fungi. *Symbolae Botanicae Upsalienses* **12**(1), 1–590.

Santesson, R; Tibell, L (1988): Foliicolous lichens from Australia. *Austrobaileya* **2**, 529–545.

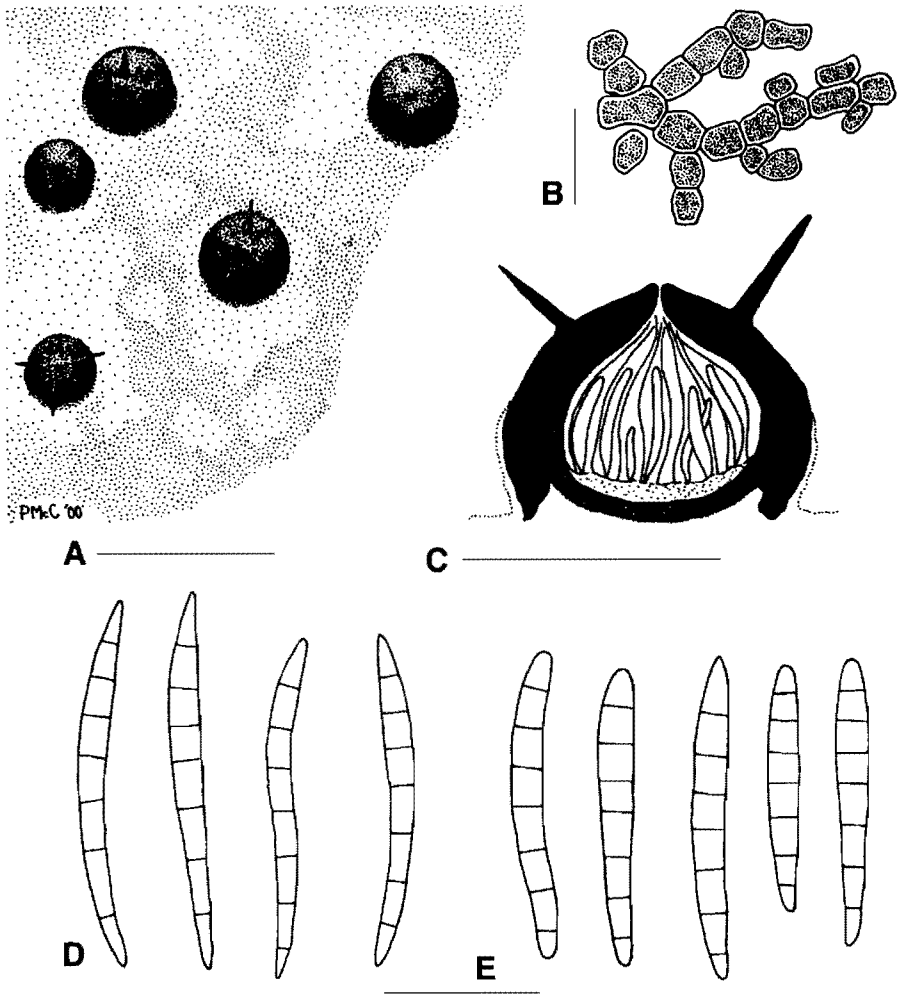

Fig. 1. *Trichothelium meridionale* (A–C, E: holotype). A, Habit of thallus and perithecia; B, Photobiont cells; C, Vertical section of perithecium (semi-schematic); D, Ascospores of HO 443044; E, Ascospores of holotype. Scales: A = 0.5 mm, B, D, E = 20 µm; C= 0.2 mm.

Four New Tridepsides from *Parmelinopsis* species

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Abstract: The new tridepsides 2,4-di-*O*-methylhiascic acid (1), 2,5-di-*O*-methylhiascic acid (2), 3-hydroxygyrophoric acid (3) and 3-hydroxy-4-*O*-methylumbilicaric acid (4) have been detected in several *Parmelinopsis* species.

The lichen genus *Parmelinopsis* has proved to be a rich source of lichen tridepsides belonging to the hiascic acid and 3-hydroxygyrophoric acid chemosyndromes (Elix & Engkaninan 1976; Elix & Jayanthi 1977, 1981; Elix *et al.* 1981, 1989a, 1989b, 1991).

In this paper we describe the identification of four further such compounds in *Parmelinopsis* species, namely 2,4-di-*O*-methylhiascic acid (1), 2,5-di-*O*-methylhiascic acid (2), 3-hydroxygyrophoric acid (3) and 3-hydroxy-4-*O*-methylumbilicaric acid (4) (Fig. 1).

Materials and Methods

Authentic material of the new tridepsides was obtained by unambiguous organic synthesis (Elix *et al.* 1998). Natural compounds were characterized by thin-layer chromatography (TLC) according to the methods standardized for lichen products (Culberson 1972, Elix & Ernst Russell 1993), and by high-performance liquid chromatography (HPLC) with retention index values (R_I) calculated from benzoic acid and solorinic acid controls (Elix *et al.* 1997, Feige *et al.* 1993). The HPLC was coupled to a photodiode array detector for ultraviolet spectroscopic comparisons. By this means the ultraviolet spectra observed for the various components eluting in the HPLC chromatogram were recorded and computer-matched against a library of ultraviolet spectra recorded for authentic metabolites under identical conditions. For each substance the correlation of ultraviolet spectra of the synthetic and natural material was greater than 99.9%.

Results and Discussion

We have now confirmed the natural occurrence of the new tridepsides (1)-(4) in several *Parmelinopsis* species. Chromatographic comparisons were conducted among the synthetic depsides and the total acetone extracts from the various lichen species by TLC in three independent solvent systems, and by HPLC coupled to a photodiode array detector for ultraviolet spectroscopic comparisons.

In this manner, extracts of the lichen *Parmelinopsis neodamaziana* (Elix & J. Johnst.) Elix & Hale were shown to contain the cortical depsides atranorin and chloroatranorin, relatively large quantities of the tridepsides gyrophoric acid, 5-*O*-methylhiascic acid, and 2,4,5-tri-*O*-methylhiascic acid, together with minor amounts of lecanoric acid and 2,5-di-*O*-methylhiascic acid (2) (Fig. 2).

In a similar manner, the extracts of the lichen *Parmelinopsis spumosa* (Asah.) Elix & Hale (Fig. 3) were shown to contain atranorin (minor), lecanoric acid (minor), gyrophoric acid (1) (major), and minor quantities of the tridepsides hiascic acid, 4-*O*-methylhiascic acid, 2,4,5-tri-*O*-methylhiascic acid, umbilicaric acid, and the new 2,4-di-*O*-methylhiascic acid (1).

Comparisons of extracts of the lichen *Parmelinopsis subfatiscens* (Kurok.) Elix & Hale (Fig. 4) with synthetic compounds confirmed the presence of the cortical depsides atranorin and chloroatranorin, relatively large quantities of the tridepsides 2,4-di-*O*-methylgyrophoric acid and 3-methoxy-2,4-di-*O*-methylgyrophoric acid, and minor or trace amounts of lecanoric acid, 4-*O*-methylgyrophoric acid, gyrophoric acid, umbilicaric acid, 5-*O*-methylhiascic acid, 4,5-di-*O*-methylhiascic acid, 2,4,5-tri-*O*-methylhiascic acid, 3-hydroxygyrophoric acid (3), and 3 hydroxy-4-0-methylumbilicaric acid (4).

Extracts of *Parmelinopsis horrescens* (Nyl.) Elix & Hale exhibited a similar array of metabolites except that 2-*O*-methylhiascic acid, umbilicaric acid, 3-methoxyumbilicaric acid, and 3-hydroxyumbilicaric acid were also detected, while 3-hydroxy-4-*O*-methylumbilicaric acid (5) was not present.

The chemical profile of the various species of *Parmelinopsis* appeared to be species-specific, to act as a fingerprint for distinguishing these species and to be invariant with geographic location.

SPECIMENS EXAMINED

Parmelinopsis horrescens (Nyl.) Elix & Hale
Australia. *New South Wales*: •Trail to Pigeon House Mountain, 19 km W of Ulladulla, 35°20'S, 150°16'E, 460 m, on exposed sandstone rocks in dry sclerophyll forest, *J.A. Elix 21306 & H. Streimann*, 2.xii.1986 (CANB). **New Zealand**. *North Island*: •Whangarei Co., Helena Bay, 35°26'S, 174°22'E, on rocks, *J.K. Bartlett* (AK).

Parmelinopsis neodamaziana (Elix & J.Johnst.) Elix & Hale
Australia. *New South Wales*: •Peckmans Plateau, Katoomba, 980 m, on sheltered sandstone ledges, *J.A. Elix 3207*, 24.iv.1977 (CANB); •Morton National Park, 7 km NE of Nerriga, 750 m, on exposed sandstone rock in open *Eucalyptus* woodland, *J.A. Elix 9161*, 18.x.1981 (CANB). *Tasmania*: •Robbins Island track, just N of Nenium Hill, 25 km NW of Smithton, 40°44'S, 144°53'E, 2 m, on *Melaleuca* in swamp, *J.A. Elix 40275 & G. Kantvilas*, 10.xii.1993 (CANB).

Parmelinopsis spumosa (Asah.) Elix & Hale
Australia. *New South Wales*: •Saltwater, E of Taree, sea level, on tree in coastal scrub, *J.A. Elix 3992*, 7.xii.1977 (CANB). **New Zealand**. *North Island*: •Auckland Ecological Region, Waitakere Ecological District, Cornwallis, 37°01'S, 174°36'E, *J.K. Bartlett*, 29.x.1983 (AK). **Norfolk Island**. •Prince Phillip Drive, 29°01'S, 167°58'E, 35 m, on *Elaeodendron* in open woodland, *J.A. Elix 18798 & H. Streimann*, 9.xii.1984 (CANB). **Papua New Guinea**. *Eastern Highlands*: •Waiopa, Aiyura-Omaura road, 13 km SE of Kainantu, 6°22'S, 145°58'E, 1450 m, on *Castanopsis* in remnant forest, *J.A. Elix 18798 & H. Streimann*, 8.xii.1982 (CANB).

Parmelinopsis subfatiscens (Kurok.) Elix & Hale
Australia. *New South Wales*: •Currowan State Forest, 12 km W of Nelligen, 120 m, on mossy granite rocks in wet sclerophyll forest, *J.A. Elix 3593*, 7.vii.1977 (CANB). **New Zealand**. *South Island*: •8 km E of Westport, 15 m, on gorse in mixed podocarp forest, *J.A. Elix 7329*, 27.ii.1980 (CANB). **Papua New Guinea**. *Southern Highlands*: •Kengaput, 6 km SE of Mendi, 1740 m, on sapling in *Dacrydium* swamp, *J.A. Elix 12974 & H. Streimann*, 13.xii.1982 (CANB).

References

Culberson, CF (1972): Improved conditions and new data for the identification of lichen products by a standardized thin layer chromatographic method. *Journal of Chromatography* **72**, 113–125.

Elix, JA; Engkaninan, U (1976): 4,5-Di-*O*-Methylhiascic Acid, a new tridepside from the lichens *Parmelia pseudofatiscens* and *Parmelia horrescens*. *Australian Journal of Chemistry* **29**, 2701–2705.

Elix, JA; Ernst-Russell, KD (1993): *A catalogue of standardized thin layer chromatographic data and biosynthetic relationships for lichen substances*, second edition, Australian National University, Canberra.

Elix, JA; Jayanthi, VK (1977): 5-*O*-Methylhiascic Acid, a new tridepside from Australian lichens, *Australian Journal of Chemistry* **30**, 2695–2704.
Elix, JA; Jayanthi, VK (1981): 3-Methoxy-2,4-di-*O*-methylgyrophoric acid, a novel tridepside from the lichen *Parmelia subfatiscens*. *Australian Journal of Chemistry* **34**, 1153–1156.
Elix, JA; Jayanthi, VK; Leznoff, CC (1981): 2,4-Di-*O*-methylgyrophoric acid and 2,4,5-tri-*O*-methylhiascic acid. New tridepsides from *Parmelia damaziana*. *Australian Journal of Chemistry* **34**, 1757–1761.
Elix, JA; Jayanthi, VK; McCaffery, LF; Yu, J (1998): Synthesis of lichen tridepsides. *Australian Journal of Chemistry* **51**, 1045–1052.
Elix, JA; Jayanthi, VK; Wardlaw, JH (1989): 2-*O*-Methylhiascic acid, a new tridepside in the lichen *Parmelinopsis neodamaziana*. *Australian Journal of Chemistry* **42**, 1423–1426.
Elix, JA; Wardlaw, JH; Archer, AW; Lumbsch, HT; Plümper, M (1997): Four new depsidones from *Pertusaria* and *Lecanora* lichens. *Australasian Lichenology* **41**, 22–27.
Elix, JA; Yu, J; Adler, MT (1989): 3-Hydroxyumbilicaric acid and 3-methoxyumbilicaric acid, new tridepsides from the lichen *Parmelinopsis bonariensis*. *Australian Journal of Chemistry* **42**, 765–770.
Elix, JA; Yu, J; Tønsberg, T (1991): 4-*O*-Methylhiascic acid and 5-*O*-acetyl-4-*O*-methylhiascic acid, two new lichen tridepsides. *Australian Journal of Chemistry* **44**, 157–163.
Feige, GB; Lumbsch, HT; Huneck, S; Elix, JA (1993); The identification of lichen substances by a standardized high-performance liquid chromatographic method. *Journal of Chromatography* **646**, 417–427.

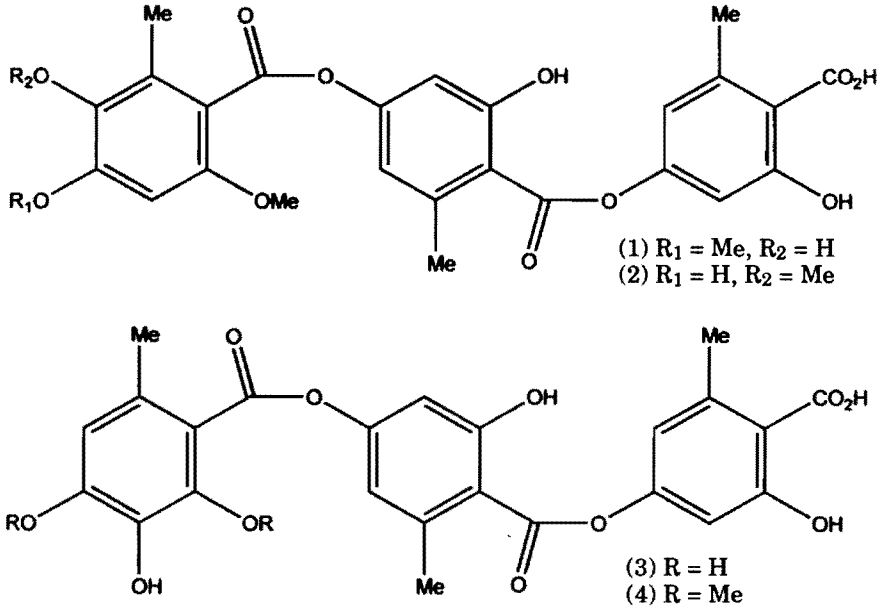

Fig. 1. Structure of new tridepsides.

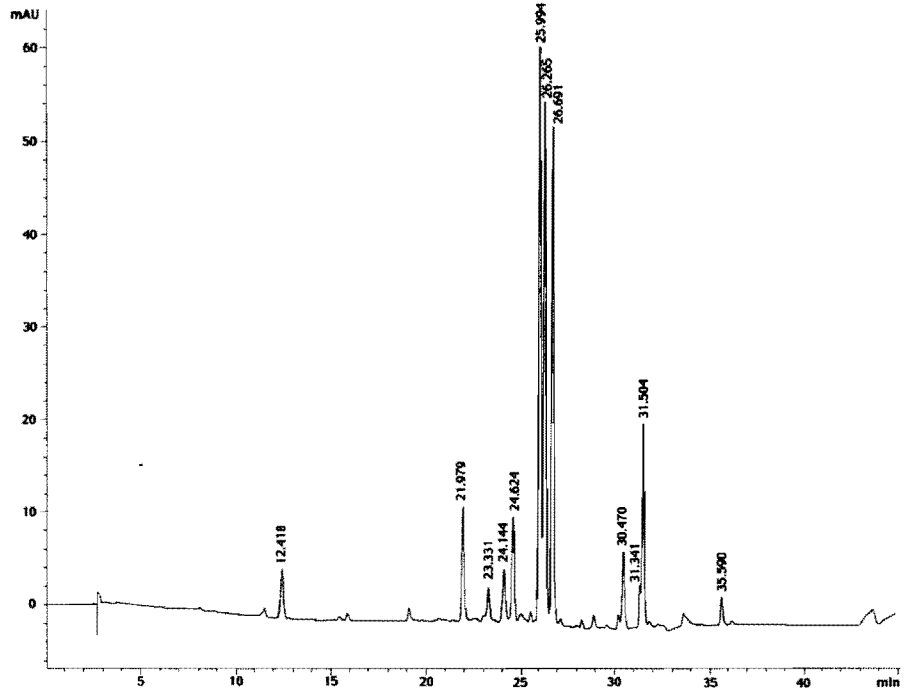

Fig. 2. HPLC of acetone extract of *Parmelinopsis neodamaziana* (*J.A. Elix 9161*). R_T 12.418 = benzoic acid (internal standard); R_T 21.979 = lecanoric acid; R_T 23.331 = unknown pigment; R_T 24.144 = hiascic acid; R_T 24.624 = 2,5-di-*O*-methylhiascic acid; R_T 25.994 = 5-*O*-methylhiascic acid; R_T 26.265 = gyrophoric acid; R_T 26.691 = 2,4,5-tri-*O*-methylhiascic acid; R_T 30.470 = atranorin; R_T 35.341 = superlatolinic acid (internal standard); R_T 31.504 = chloroatranorin; R_T 35.590 = superlatolic acid (internal standard).

Lecanora pseudodecorata, a new species from Australia

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In connection with our studies of lecanoroid lichens in Australia, we have found a new *Lecanora* species that was collected in Queensland and differs from the Japanese species *L. decorata* Vain. in anatomical and chemical characters.

Thalli and apothecia were cut using a freezing microtome in sections 16–20 µm thick and stained with lactophenol cotton-blue. The chemical constituents were identified using thin-layer chromatography (Culberson 1972, Culberson & Johnson 1982) and gradient elution high performance liquid chromatography (Feige *et al.* 1993).

Lecanora pseudodecorata Lumbsch & Elix sp. nov. Fig. 1.
Thallus saxicola, crustaceus vel peltatus, crassus, continuus vel rimosus, luteo-viridis vel luteus. Soredia nulla. Prothallus non evolutus vel atrobrunneus. Apothecia immersa, 0.5–2.0 mm diametro, disci fusci vel rubrofusci, epruinosi. Epihymenium rubrofuscum, granulosum. Hypothecium hyalinum. Asci clavati, octospori. Sporae hyalinae, late ellipsoideae vel ellipsoideae, 9.5–13.0 × 6.5–8.0 µm. Thallus arthothelinum et acidum thiophanicum continens.

Type: **Australia**, *Queensland*: •Conway State Forest, 16 km E of Proserpine, 20°21'S, 148°44'E, on rocks beside stream in lowland rainforest, 28.vi.1986, *J.A. Elix 20800 & H. Streimann* (CANB, holotype).

Thallus saxicolous, crustose to peltate, thick (1–3 mm), roundish, flat to convex, continuous to rimose, yellowish green to yellow, epruinose, sometimes glossy. Soredia absent. Prothallus not visible or blackish grey. Apothecia immersed in the thallus, 0.5–2.0 mm wide, discs dark grey-brown to dark red-brown, epruinose. Cortex absent. Amphithecium absent. Parathecium 10–15 µm thick, hyaline, interspersed with small crystals (Pol+). Epihymenium red-brown, *c.* 10 µm high, not altered by KOH, with crystals (Pol+), soluble in KOH. Hymenium and hypothecium hyaline. Paraphyses slightly branched and thickened at the apices. Asci clavate, 8-spored. Spores hyaline, simple, broadly ellipsoid to ellipsoid, 9.5–13.0 × 6.5–8.0 µm.

Chemistry: Thallus K–, C+ orange, PD–, containing arthothelin (major) and thiophanic acid (minor).

This species occurs on quartzitic rocks in shaded habitats. It is only known from one locality in Queensland where it occurs beside a stream in a lowland rainforest.

Lecanora pseudodecorata is characterized by the crustose to peltate thallus, aspicilioid ascomata, the granulose, red-brown epihymenium and the presence of xanthones. *Lecanora contractuloides* Lumbsch & Elix, a peltate alpine species in Australia, is distinguished by the whitish to grey thallus and the presence of 2,7-dichlorolichexanthone (Lumbsch & Elix 1997). Other Australian *Lecanora* species with aspicilioid apothecia include *L. demersa* (Kremp.) Hertel & Rambold, *L. oreinoides* (Korb.) Hertel & Rambold, and *L. subimmersa* Fée. All contain atranorin and have a greyish or whitish thallus. *Lecanora demersa* and *L. oreinoides* are further distinguished by their blackish apothecial discs (Rambold 1989) and *L. subimmersa* by smaller apothecia, narrower ascospores, and an egranulose epihymenium (Lumbsch 1994).

The new species is morphologically very similar to *Lecanora decorata* (Vainio 1921) [Type: Japan. Prov. Shinano, Mt. Yatsugatake, on rock, 4.viii.1916, A. Yasuda 130 (TUR-V-5752, holotype!)], but differs from that species in anatomical and chemical characters. Furthermore, *L. pseudodecorata* has a darker apothecial disc which remains dark when wet. *Lecanora decorata* has slightly larger ascospores (12.0–15.5 × 6.5–9.0 µm) and a dark blue-green epihymenium, and lacks xanthones but contains usnic acid and unidentified fatty acids.

ADDITIONAL SPECIMEN EXAMINED
Queensland: •type locality, *J.A. Elix 20796 & H. Streimann* (CANB).

References

Culberson, CF (1972): Improved conditions and new data for the identification of lichen products by a standardized thin-layer chromatographic method. *Journal of Chromatography* **72**, 113–125.

Culberson, CF; Johnson, A (1982): Substitution of methyl tert.-butyl ether for diethyl ether in standardized thin-layer chromatographic method for lichen products. *Journal of Chromatography* **238**, 438–487.

Feige, GB; Lumbsch, HT; Huneck, S; Elix, JA (1993): Identification of lichen substances by a standardized high-performance liquid chromatographic method. *Journal of Chromatography* **646**, 417–427.

Lumbsch, HT (1994): Die *Lecanora subfusca*-Gruppe in Australasien. *Journal of the Hattori Botanical Laboratory* **77**, 1–175.

Lumbsch, HT; Elix, JA (1997): Five new species of *Lecanora* from Australia (lichenized Ascomycotina; Lecanoraceae). *Mycotaxon* **67**, 391–403.

Rambold, G (1989): A monograph of the saxicolous lecideoid lichens of Australia (excl. Tasmania). *Bibliotheca Lichenologica* **34**, 1–345.

Vainio, EA (1921): Lichenes ab A. Yasuda in Japonia collecti. Continuatio I. *Botanical Magazine, Tokyo* **35**, 45–79.

Fig. 1. *Lecanora pseudodecorata* Lumbsch & Elix sp. nov. 5 mm

Photographing lichens without a camera

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Introduction

Colour photographs are indispensable to lichenologists for illustrating taxa, character states, and glossary terms in journals, monographs, fieldguides, checklists, and Floras. Historically, though, they have been used only sparingly because they cost so much to print. However, in recent years that cost has fallen dramatically with the rapid growth of electronic media and digital publishing—it now costs almost nothing to display a full-colour image on a website or in an interactive key, and digital printing has lowered the cost of even hard-copies by as much as a third. Moreover, storing large digital images electronically is already cheap and steadily getting even cheaper.

As a lichenologist you suddenly have the luxury of being able to use hundreds or even thousands of photographs to illustrate your work. However, that luxury might seem only a wishful dream if you're not a skilled photographer. You could hire a photographer, but good professionals don't come cheap, and if they're unfamiliar with the specimens you want photographed, then you must spend time supervising them as well. You could learn the necessary photographic skills yourself, but that could take years, and the film and processing for the many necessary "cut-and-try" experiments would cost you plenty. You could avoid that film cost entirely with a digital camera—the newest of them generate over 3 million pixels, half again as many as a 1200 dpi slide-scan—but they too are expensive, and more important, very few are reflex models that focus directly through the lens, which is essential for close-up work. Fortunately, though, you have a cheap and quick alternative—with an inexpensive flatbed scanner, you can make a digital image of a specimen within minutes, and then with off-the-shelf graphics software like Photoshop™, you can sharpen it, balance its colours, and alter it in numerous other ways to turn it into a high-quality image ready for immediate publication in either electronic or hard-copy formats. The two photographs below compare film and scanner images—the one on the left was taken on film with a US$4000 magnetic-shutter camera fitted to an equally costly dissection microscope, whereas the one on the right was taken electronically with a US$240 flatbed scanner.

Porpidia macrocarpa habit (film image on left, flatbed scanner image on right).

Methods

Equipment: We used an Epson™ 1200-S flatbed scanner wired to feed image data directly into a Macintosh G3 computer. Any computer with at least 180 Mhz processor speed and 64 MB (megabytes) of RAM (random-access memory) would be suitable for loading and manipulating even large image files. To provide a uniform and out-of-focus background for scans, we removed the scanner's lid and replaced it with an upside-down home-made tray of the same area and shape as the scanner's platen but 5 cm deep. We hot-glued the tray together from panels of 3-mm-thick MDF (medium density fibreboard), and spray-painted it matte black on the inside.

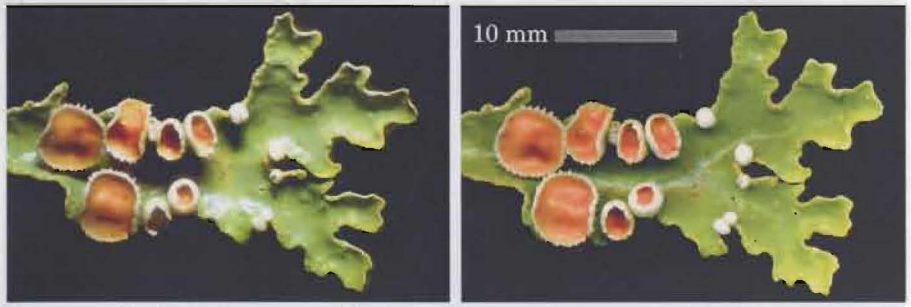
Specimens: Scanners are like cameras in having a limited depth of field, so the flatter the specimen, the sharper your scans will be. However, a scanner's depth of field is about as good as a camera's, and able to scan most lichen growth-forms. Dried specimens can be flattened somewhat by wetting them and then covering them with a sheet of glass (2–10 mm thick). Reflections from the glass sometimes show up in the scan, but they can be removed later with image-editing software.

Scanning: Remove the scanner's lid and lay the specimen on the platen with its "good" side down. For two reasons, you should place it in an upper corner of the platen: (1) the light and sensor won't have to travel far, so scanning will be quicker, and (2) the light in the scanned image will seem to be coming from one direction and thus mimic sunlight. To change that apparent direction, you need only rotate the specimen, as shown below with a thallus lobe scanned at 0°, 90°, and 180°.

Pseudocyphellaria faveolata lobe scanned at 0°, 90°, and 180° to simulate sunlight coming from different directions.

In placing your specimen, be warned that some large scanners have "sour" areas, usually near the edges of the platen, where focus and colour balance are poor. You can find where they are by test-scanning at 600 dpi a uniform and highly detailed colour pattern that completely covers the platen, then zooming in on the scan and looking for blurred edges and red, green, or blue halos. Focus can be ruined by a dirty platen, too, so always clean the platen between scans, using a non-abrasive liquid glass cleaner and a clean cotton cloth (not a paper towel). The platen can also be fogged by water evaporating from hydrated specimens. That problem usually disappears as the scanner warms up, but if not, you can solve it by warming the platen briefly with an electric hair-dryer set on low heat.

Shadows are stronger on film than in scans because sunlight or a flash are far more unidirectional than a scanner's light source, as shown below in the side-by-side images of a thallus lobe made by a camera and a flatbed scanner. However, you can strengthen scanned shadows by dismantling the flatbed and masking its light source on the *same* side as the specimen. The scan inevitably will be darker, but you can compensate for that by means of the controls on the flatbed itself before scanning, or by means of graphics software after the scanning.



Pseudocyphellaria homoeophylla lobe showing the strong shadows of a typical camera image (left) and the weaker shadows of a flatbed scanner image (right).

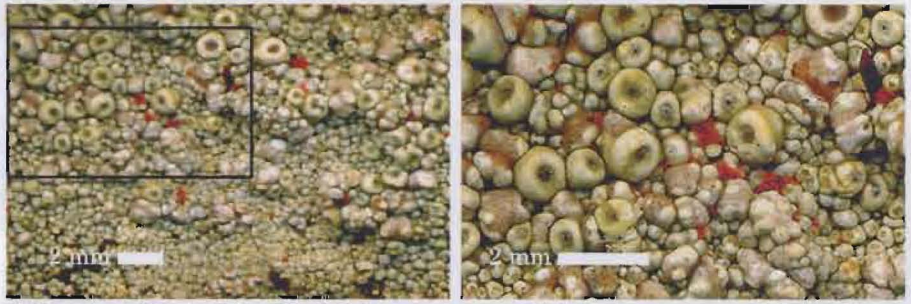
For detached specimens of fruticose lichens such as *Alectoria*, *Neuropogon*, and *Cladia*, change the background from black to grey. However, avoid a "dead-white" background, because light randomly scattered by it is likely to fog the scan ruinously (film images suffer just as badly from such "flaring"). The three flatbed scans below compare the effects of black, grey, and off-white backgrounds.

Cladia sullivanii scanned on a flatbed with black, grey, and ivory backgrounds.

Set the scanner controls to cover an area slightly larger than the specimen, and choose "reflective" rather than "transparent" mode, "millions of colours" even if you want only a black-and-white image (and ensure too that your monitor is set to display all those colours), and 100% scale (neither enlarging nor reducing). Turn off sharpening and compression. If you can alter so-called gamma, set it at 1.8 (or its equivalent in whatever scale your scanner software uses). The resolution you

choose for the scan depends on the size of your specimen, whether you want to display it on-screen or print it, and the size of that final on-screen or printed image. In general, the larger the specimen and the smaller the final image, the lower the resolution can be. An unnecessarily high resolution not only wastes file storage space but paradoxically can also blur details of the specimen and dull its colours, because in reducing image-size a computer can not make pixels smaller but instead must jettison some of them altogether. Therefore, if you plan to display or print your scanned image at various sizes, and especially if your specimen is rare, perishable, or on loan, make *three* scans with the resolution set at 150, 300, and 600 dpi (labelling them clearly).

Some late-model flatbeds will scan as high as 1200 dpi "true" (that is, without having to generate pixels by interpolation). Such a high resolution is useful for scanning small crustose species. It's useful as well for making high-magnification "details" of low-magnification scans, as in the two images below. However, high resolution scans are massive, so if you scan many specimens at 1200 dpi, you'll soon need a high-capacity data-storage device like a writable CD-cutter or a DVD-RAM drive.



Coccotrema cucurbitula habit. The image on the left was scanned at 1200 dpi so that an equally sharp 600 dpi detail could be harvested from it (black marquee).

Image manipulation: To alter the scanned images in the colour plate, we used Photoshop™ 4.0 (a later version is out, but you'll pay more for it). Similar software should give much the same results. However, avoid the scaled-down versions that typically are bundled with cheap scanners. With Photoshop and other image-editing software, you can alter a scanned image in myriad subtle ways, but the three most important ones are (1) brightness, contrast, and gamma, (2) colour balance, and (3) sharpness. Photoshop also lets you "fade" most of the alterations you make, in 1% steps from 99% down to zero (no effect at all).

(1) Most graphics software allows you to alter brightness, contrast, and gamma by several means, but arguably the best is with the image displayed on-screen side-by-side with an RGB (combined red, green, and blue) histogram of it. In Photoshop, you would call up LEVELS, select PREVIEW (so that you can immediately see the effect on the scan of any changes you make to it), then raise the black level by shifting its slider close to the histogram's left edge, and conversely lower the white level by shifting its slider close to the histogram's right edge. Gamma correction alters the brightness of mid-tones without affecting either the shadows (black) or the highlights (white), so raise it if your scan is too dark (underexposed) and lower it if your scan is too light (overexposed). You can lighten or darken smaller areas using dodge and burn tools (terms borrowed from photography) and also restrict those effects to highlights, mid-tones, or shadows.

Pseudocyphellaria billardierei upper surface illustrating the strongly faveolate thallus and black marginal apothecia—scanned on a flatbed at 600 dpi.

Pseudocyphellaria billardierei lower surface illustrating the pale glabrous margin, tomentum, and verruciform pseudocyphellae—scanned on a flatbed at 600 dpi.

(2) Photoshop has several tools for adjusting colour balance, allowing you to alter red, green, and blue separately, or to sample a single colour and then alter its hue, saturation, and lightness throughout the scan, or to delete a colour or replace it with another. As with the brightness and contrast controls, you can restrict all of those effects to highlights, mid-tones, or shadows.

(3) Sharpen last of all, and use a judicious mix of over-all, edges-, and spot-sharpening (in that order). Try "unsharp mask" as well—although the name suggests that it will blur the image, in fact it's yet another sharpening tool, and often works particularly well on flatbed scans. Whatever mix of sharpening tools you adopt, always experiment on a *copy* of the file rather than the real thing, and resist the urge to over-sharpen. However, when reducing ("down-sizing") an image (for example to a 400 × 400 pixel colour bitmap for displaying on-screen on a website or in an interactive key), you're likely to blur it as well, so always check to see if resharpening will restore its original quality.

With the many tools of image-editing software, you can alter your scans in almost any way that you can imagine, and even in ways that you must see to believe! However, keep in mind that your goal is to match the original specimen.

Archive the finished file in a PICT, TIFF, or other low-loss format and without any compression. Back-up all your scan files, preferably on a writable CD or some other highly stable storage medium. If you later need a GIF, JPEG, or BMP format, make it from a copy of that original.

Conclusions

A cheap modern flatbed scanner rivals an expensive camera for photographing lichens. Hence, *without* a camera or photographic skills you can reliably, cheaply, and quickly make high-quality illustrations of lichens for immediate publication electronically or in hard-copy. A flatbed scanner is especially useful for photographing high-contrast specimens, which are hard to capture on film because no one camera setting can best bring out the details of both the light and dark areas. As a result, even experienced photographers offset the risk of losing such a shot by "bracketing" what seems likely to be the correct exposure with two or three others deliberately set higher and lower, but even then they can't be sure of success until the film has been processed. Scanning specimens on a flatbed neatly solves that problem, and in our view, such an advantage is reason enough to adopt the technique. Even professional photographers would be sensible to keep it as a back-up or an alternative to film.

As for disadvantages, shadows are weaker in scans than in film images. You can't photograph landscape habitats with a flatbed either, but for those shots you can resort to an automatic or digital camera, which require little skill. Nor can you photograph lichens that are growing on surfaces which you can't bring inside, such as large boulders or man-made structures like gravestones, fenceposts, buildings, and bridges. Even if you could set up a portable power supply for your flatbed, you couldn't be sure of scanning such surfaces because flatbeds don't work reliably when they're tilted. However, in future if specimen scanning becomes common, as seems likely, then you'll no doubt be able to buy flatbed models that are powered by rechargeable batteries and are designed to work at any angle. The laptop computers you'll need for controlling them are already rugged enough for field work, and they're also fully as fast and RAM-capable as desktop models.

Acknowledgment

We thank Kevin Archer for technical advice and for obtaining equipment.

Additional lichen records from Oceania 5. Miscellaneous new records

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New records of ten lichen taxa are reported from Fiji, Norfolk Island and Tonga. These include *Pyrenula ochraceoflava* var. *ochraceoflava* P.M. McCarthy, recently described from the Cook Islands, which is now known from an almost identical habitat in Fiji, and a second record of *Porina austropacifica* P.M. McCarthy.

1. **Anisomeridium consobrinum** (Nyl.) Aptroot, *Biblioth. Lichenol.* **57**, 21 (1995)
Recently reported from the Cook Islands (McCarthy 2000a) and Fiji (McCarthy & Elix 2000). The Tongan specimen has a UV+ whitish thallus, rather than UV+ yellow or yellowish orange as was reported previously.

SPECIMEN EXAMINED
Tonga. •Tongatapu Island, coast S of Utulau village, 21°11'S, 175°16'W, alt. 5 m, on trunk of *Syzygium richii*, *A.E. Wright 8116*, 5.vii.1988 (AK 184228).

2. **Calicium hyperelloides** Nyl., *Syn. Meth. Lich.* **1**, 153 (1860)
Thallus pale yellowish green, verruculose, C+ orange. Apothecia black, apart from a faint greyish-pruinose band near the rim of the excipulum, 0.35–0.9 mm tall, with a 0.08–0.12(–0.16) mm thick, glossy stalk with a thin, hyaline outer layer (section); capitulum 0.2–0.35 mm diam. Ascospores dark brown, 1-septate, 8–12 × 5–7 µm, with a minutely cracked surface. A widespread, warm-temperate to tropical species; this, however, is the first published record from the more remote Pacific islands. A detailed description can be found in Tibell (1987).

SPECIMEN EXAMINED
Tonga. •Ha'apai Group, Lifuka Island, old plantation S of Pangai, 19°49'S, 174°21'W, alt. 4 m, on dead wood of *Cocos nucifera*, *A.E. Wright 8165*, 10.vii.1988 (AK 184379).

3. *Gyalectidium filicinum* Müll. Arg, *Flora* **64**, 101 (1881)
Thallus thin, verruculose, off-white, without sterile hairs. Apothecia 0.1–0.4 mm diam., immersed; disc slightly concave, yellowish grey; epithecium containing algae. Paraphyses anastomosing. Asci 1-spored. Ascospores ellipsoidal, muriform, 30–60 × 10–20 µm. In the Pacific known from Lord Howe Island, Western Samoa, Isla del Coco and Islas Galapagos (Elix & McCarthy 1998). A detailed description can be found in Santesson (1952).

SPECIMENS EXAMINED
Norfolk Island. •Mt Pitt Reserve, Filmy Fern Trail, 29°01'S, 167°57'E, alt. 130 m, on palm leaves in subtropical rainforest, *J.A. Elix 18399* (part), *18400* (part) & *H. Streimann*, 3.xii.1984 (CANB).

4. **Letrouitia bifera** Hafellner, *Nova Hedwigia* **35**, 666 (1981)
Thallus thick, green-orange, rimose, smooth to verrucose. Apothecia mostly 1–2 mm diam., sessile, with a plane, dark brown disc and a thick, persistent, dark orange proper margin (K+ purple). Asci 2(–4)-spored, rarely 1-spored or up to 6-spored (then several aborting). Ascospores muriform (the cells in a spiral arrangement), 38–54 × 16–21 µm. In the Pacific, already known from New Cale-

donia, Norfolk Island and Tahiti (Hafellner 1981). A detailed description can be found in Hafellner (1981).

SPECIMEN EXAMINED
Tonga. •'Eua Island, roadside N of Houma, 21°17'S, 174°55'W, alt. 145 m, on tree trunk, *A.E. Wright 7652*, 13.x.1986 (AK 177578).

5. **Megalospora sulphurata** Meyen var. **sulphurata**, *in* Meyen & Flotow, *Nova Actorum Acad. Caes. Leopold.-Carol. Nat. Cur.* **19**, Suppl., 228 (1843)
Thallus pale yellowish grey, rimose, sorediate, PD–. Apothecia mostly 1–3 mm diam., sessile, at first plane, becoming strongly convex, with a blackish disc and a thin, somewhat paler margin; epithecium orange-brown. Asci (1–)2–6-spored. Ascospores 1-septate, 48–68 × 25–33 µm, with uniformly thin walls and septum. This pantropical species is known from New Caledonia, Western Samoa, the Society Islands and the Hawaiian Islands. A detailed description can be found in Sipman (1983).

SPECIMEN EXAMINED
Tonga. •'Eua Island, just below highest point, 21°22'S, 174°55'W, alt. 310 m, on tree trunk in forest, *A.E. Wright 7692*, 15.x.1986 (AK 177554).

6. **Porina austropacifica** P.M. McCarthy, *Australasian Lichenology* **46**, 21 (2000)
This lichen was recently described from a single locality in Norfolk Island (McCarthy 2000b); a second specimen has since come to light.

SPECIMEN EXAMINED
Norfolk Island. •Mount Pitt National Park, track between Mt Pitt and Mt Bates, 29°00'05"S, 167°56'05"E, alt. 270 m, on *Nestegis* in disturbed forest on ridge, *J.A. Elix 27395*, 15.vi.1992 (CANB).

7. **Pyrenula macularis** (Zahlbr.) R.C. Harris, *Mem. New York Bot. Gard.* **49**, 94 (1989)
This pantropical species was recently reported from the Cook Islands (McCarthy 2000a) and Fiji (McCarthy & Elix 2000). A description can be found in Harris (1989).

SPECIMENS EXAMINED
Tonga. •'Eua Island, 'Ufilei Beach, 21°20'S, 174°57'W, alt. 3 m, on twigs of shrubs, *A.E. Wright 7642* (part), 11.x.1986 (AK 177573); •Ha'apai Group, Foa Islands, swamp S of Lotofoa, 19°45'S, 174°18'W, alt. 0 m, on rotting trunk of *Erythrina ?fusca*, *A.E. Wright 8325* (part), 21.vii.1988 (AK 184426).

8. **Pyrenula ochraceoflava** (Nyl.) R.C. Harris var. **ochraceoflava**, *Mem. New York Bot. Gard.* **49**, 96 (1989)
A common Pacific species, recently reported from the Cook Islands (McCarthy 2000a) and Fiji (McCarthy & Elix 2000), this lichen probably occurs in lowland and coastal habitats on most South Pacific islands. Descriptions can be found in Harris (1989) and McCarthy (2000).

SPECIMENS EXAMINED
Tonga. •Ha'apai Group, Foa Islands, swamp S of Lotofoa, 19°45'S, 174°18'W, alt. 0 m, on rotting trunk of *Erythrina ?fusca*, *A.E. Wright 8320* (part), *8325* (part), 21.vii.1988 (AK 184421, 184426).

9. **Pyrenula ochraceoflava** var. **pacifica** P.M. McCarthy, *Lichenologist* **32**, 32 (2000)
Recently described from an almost identical habitat in Rarotonga, Cook Islands (McCarthy 2000a), this variety is characterised by having shorter ascospores than var. *ochraceoflava*, and a single transverse septum separating 2 tiers of up to 4 locules. A detailed description can be found in McCarthy (2000a).

SPECIMENS EXAMINED
Fiji. •Viti Levu, Coral Coast, Tagaque village, 20 km E of Sigatoka, on bark of *Cocos nucifera* on foreshore, *J.A. Elix 15330, 15331*, 29.viii.1983 (CANB).

10. **Strigula smaragdula** Fr.: Fr., *Linnaea* **5**, 550 (1830)
This pantropical, foliicolous lichen is known from several widely scattered islands and island groups in the Pacific Ocean (Elix & McCarthy 1998). A detailed description can be found in Santesson (1952, as *S. elegans*).

SPECIMEN EXAMINED
Norfolk Island. •Rocky Point Reserve, 29°02'57"S, 167°55'15"E, alt. 45 m, on leaves of *Nestegis apetala* in disturbed forest, *H. Streimann 53851*, 17.iv.1994 (CANB).

I am grateful to Doug Rogan (AK) for organising the loan of Tongan specimens.

References

Elix, JA; McCarthy, PM (1998): Catalogue of the lichens of the smaller Pacific islands. *Bibliotheca Lichenologica* **70**, 1–361.
Hafellner, J (1981): Monographie der Flechtengattung *Letrouitia* (Lecanorales, Teloschistinae). *Nova Hedwigia* **35**, 645–729.
Harris, RC (1989): A sketch of the family Pyrenulaceae (Melanommatales) in eastern North America. *Memoirs of the New York Botanical Garden* **49**, 74–107.
McCarthy, PM (2000a): The lichens of Rarotonga, Cook Islands, South Pacific Ocean I: pyrenocarpous taxa. *Lichenologist* **32**, 15–47.
McCarthy, PM (2000b): *Porina austropacifica* (Trichotheliaceae), a new species from Norfolk Island. *Australasian Lichenology* **46**, 21–24.
McCarthy, PM; Elix, JA (2000): Additional lichen records from Oceania 4. Some pyrenolichens in Fiji. *Australasian Lichenology* **46**, 40–42.
Santesson, R (1952): Foliicolous lichens I. A revision of the taxonomy of the obligately foliicolous, lichenized fungi. *Symbolae Botanicae Upsalienses* **12**(1), 1–590.
Sipman, HJM (1983): A monograph of the lichen family Megalosporaceae. *Bibliotheca Lichenologica* **18**, 1–241.
Tibell, L (1987): Australasian Caliciales. *Symbolae Botanicae Upsalienses* **27**(1), 1–280.

Additional lichen records from Oceania 6. Some corticolous pyrenolichens in Vanuatu

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Elix & McCarthy (1998) reported 41 lichen taxa from Vanuatu, a group of islands located to the north-east of New Caledonia at latitude 13–21°S and longitude 166–170°E. In this paper, new records of ten corticolous species of *Porina* (Trichotheliaceae), *Pseudopyrenula* and *Trypethelium* (both Trypetheliaceae) are reported from Éfaté and Espíritu Santo, two of the larger islands of Vanuatu. *Porina limitata* and *P. tetracerae* var. *persimilis* are reported for the first time outside tropical Australia, while *P. mastoidella* was previously known only from India.

All specimens were collected by H. Streimann and P. Ala in 1998. Those cited below are held in CANB; supposed duplicates of some have been deposited in B and PVV, but these have not been seen by me.

1. **Porina eminentior** (Nyl.) P.M. McCarthy, *Lichenologist* **32**, 42 (2000)
This pantropical lichen is characterized by its pale creamy buff, pale yellowish green, or pale to medium olive-brown thallus, large perithecia and muriform ascospores. Its range includes New Guinea, coastal areas of Queensland, New Caledonia, Lord Howe Is. and Western Samoa. For a detailed, illustrated description, see McCarthy (1995; as *Clathroporina eminentior*).

SPECIMENS EXAMINED
Vanuatu. *Espíritu Santo*: •Luganville–Hog Harbour road, past Matevala Plantation, 16 km N of Luganville, 15°22'S, 167°11'E, alt. 0 m, on shaded *Adenanthera pavonia* in strand vegetation, *H. Streimann 62918 & P. Ala*, 24.x.1998 (CANB). *Éfaté*: •Forari Logging Area, 17 km ENE of Port Vila, 17°38'S, 168°27'E, alt. 300 m, in lowland rainforest, *H. Streimann 63058, 63119 & P. Ala*, 25.x.1998 (CANB).

2. **Porina internigrans** (Nyl.) Müll. Arg., *Rep. Meetings Australas. Assoc. Advancem. Sci.* **1895**, 452 (1895)
Similar in colour to the previous species, *P. internigrans* has large, convex to hemispherical perithecial verrucae and 50–90 × 9–17 µm ascospores with 7–13 septa. It is known from the Andaman Islands, South-east Asia, New Guinea, eastern Queensland and New Caledonia. For a detailed, illustrated description, see McCarthy (1994a).

SPECIMENS EXAMINED
Vanuatu. *Espíritu Santo*: •Hasevaia (near mouth of Adsone R.), 23 km NNW of Luganville, 15°35'S, 166°58'E, alt. 3 m, on shaded tree base in strand vegetation, *H. Streimann 62869 & P. Ala*, 23.x.1998 (CANB). *Éfaté*: •ridge below Mt McDonald, 15 km NNE of Port Vila, 17°35'S, 168°21'E, alt. 600 m, on shaded tree trunk in rainforest, *H. Streimann 63298 & P. Ala*, 28.x.1998 (CANB).

3. **Porina limitata** C. Knight, *in* Bailey, *Syn. Queensland Fl., Suppl.* **1**, 73 (1886)
Previously thought to be endemic to eastern Queensland, *P. limitata* has a pale sandy brown to pale greyish green thallus, medium-sized, convex to hemispherical perithecial verrucae that, significantly, have a ± concolorous apex. The ascospores are 7–9-septate and 38–58 × 6–10 µm. For a detailed, illustrated description, see McCarthy (1994b).

SPECIMEN EXAMINED
Vanuatu. *Espíritu Santo*: •logging area near Lavatmas, 48 km NNW of Luganville, 15°07'S, 167°01'E, alt. 300 m, on shaded *Pisonia umbellifera* in lowland forest, *H. Streimann 62831 & P. Ala*, 22.x.1998 (CANB).

4. **Porina mastoidea** (Ach.) Müll. Arg., *Bot. Jahrb. Syst.* **6**, 399 (1885)
This quite variable pantropical species has thalli that range from thin and smooth to quite thick and rugose to verrucose. The perithecial verrucae are 0.36–0.9 mm diam. and often, but not always, have a broad, blackish periostiolar cap. The ascospores are medium-sized and predominantly 7-septate. Interestingly, the Vanuatu specimen is close to the robust end of the continuum of thalline morphology. For a detailed, illustrated description, see McCarthy (1993).

SPECIMEN EXAMINED
Vanuatu. *Éfaté*: •Iririki I., Port Vila harbour, on semi-shaded *Gyrocarpus* trunk in rainforest, *H. Streimann 61980 & P. Ala*, 1 5.x.1998 (CANB).

5. **Porina mastoidella** (Nyl.) Müll. Arg., *Bot. Jahrb. Syst.* **6**, 401 (1885)
Verrucaria mastoidella Nyl., *Flora* **50**, 8 (1867). Type: India, Calcutta, Botanical Garden, on bark of *Cycas rumphii, S. Kurz 99a* [Holotype—H-NYL. 1947!].
Thallus epiphloeodal, to 5 cm wide, pale grey-green, smooth to rugulose and verruculose, partly matt, partly glossy (especially towards the margin), 30–60 µm thick, heavily impregnated with crystals, ± ecorticate; dark hypothallus lacking; prothallus silvery grey. Algae *Trentepohlia*; cells ellipsoidal. Perithecial verrucae shallowly to markedly convex, 0.25–0.35(–0.39) mm diam.; periostiolar cap pale to medium orange-brown to reddish brown, 0.08–0.16 mm wide; ostiole concolorous or a little darker. Involucrellum apical and vestigial. Excipulum *c.* 10 µm thick, pale orange-brown. Centrum 0.1–0.16 mm diam. Asci narrowly cylindrical to narrowly obclavate; apex subtruncate. Ascospores narrowly oblong or narrowly fusiform, straight, curved or sigmoidal, 7-septate, 17–25 × 2.5–4 µm; perispore thin or not apparent. Pycnidia not seen (Fig. 1).

At least 100 mainly tropical species of *Porina* grow on bark and/or rock, have pale sandy brown, greenish brown or yellowish brown thalli, perithecia immersed in thallus-dominated verrucae and ascospores with 7 or more septa. A few, e.g. *P. papuensis* P.M. McCarthy, *P. polycarpa* Müll. Arg. and *P. subinterstes* (Nyl.) Müll. Arg., have comparatively short ascospores (*c.* 18–32 µm long) and small, but not minute, perithecial verrucae (*c.* 0.3–0.6 mm diam.). However, only *P. mastoidella* combines diminutive perithecial verrucae and exceptionally small, 7-septate ascospores.

The verrucae of the type specimen are slightly more prominent than those of the Vanuatu collection, and they have darker periostiolar caps.

SPECIMEN EXAMINED
Vanuatu. *Espíritu Santo*: •logging area near Lavatmas, 48 km NNW of Luganville, 15°07'S, 167°01'E, alt. 300 m, on a shaded vine in lowland forest, *H. Streimann 62817 & P. Ala*, 22.x.1998 (CANB).

6. **Porina tetracerae** (Ach.) Müll. Arg. var. **tetracerae**, *Bot. Jahrb. Syst.* **6**, 401 (1885)
A very common, pantropical lichen that is usually corticolous, *P. tetracerae* also occurs on rocks and leaves. It is less variable in appearance than the sympatric and almost equally common *P. mastoidea*, and its 7-septate ascospores are much shorter and narrower. Colonies of *P. tetracerae* frequently lack perithecia, but they

can be identified by the presence of dense patches of cylindrical to coralloid isidium-like outgrowths. For a detailed, illustrated description, see McCarthy (1993).

SELECTED SPECIMENS EXAMINED
Vanuatu. *Éfaté*: •Forari Logging Area, 17 km ENE of Port Vila, 17°38'S, 168°27'E, alt. 300 m, on shaded tree buttress in lowland rainforest, *H. Streimann 63050 & P. Ala*, 25.x.1998 (CANB). *Espíritu Santo*: •mountain inland from Navota Farm, 18 km ESE of Luganville, 15°34'S, 167°01'E, alt. 230 m, in rainforest, *H. Streimann 62171, 62183 & P. Ala*, 17.x.1998 (CANB); •logging area near Lavatmas, 48 km NNW of Luganville, 15°07'S, 167°01'E, alt. 300 m, in lowland forest, *H. Streimann 62819, 62832 & P. Ala*, 22.x.1998 (CANB).

7. **Porina tetracerae** var. **persimilis** (Müll. Arg.) P.M. McCarthy, *Nova Hedwigia* **58**, 401 (1994)
Whereas the ascospores of var. *tetracerae* are 3.5–7 µm wide, those of var. *persimilis* are narrower (2–3.5 µm). Until now, this lichen was only known from a handful of localities in north-eastern Queensland. For a detailed, illustrated description, see McCarthy (1994a).

SPECIMEN EXAMINED
Vanuatu. *Espíritu Santo*: •Mt Malel, 30 km NNW of Luganville, 15° 15'S, 167°06'E, alt. 180 m, on semi-shaded tree branch in disturbed forest, *H. Streimann 62251 & P. Ala*, 18.x.1998 (CANB).

8. **Pseudopyrenula diluta** (Fée) Müll. Arg. var. **degenerans** Vainio, *in* Schmidt, *Bot. Tidsskr.* **29**, 148 (1909)
The known distribution of this pantropical lichen includes the Philippines and the Hawaiian Islands, and it was recently reported and briefly described from Fiji (McCarthy & Elix 2000). For a detailed description, see Harris (1998).

SPECIMEN EXAMINED
Vanuatu. *Espíritu Santo*: •logging area near Lavatmas, 48 km NNW of Luganville, 15°07'S, 167°01'E, alt. 300 m, on upper branches of a large *Antiaris toxicarya* in lowland forest, *H. Streimann 62806 & P. Ala*, 22.x.1998 (CANB).

9. **Trypethelium eluteriae** Spreng., *Anleitung Kenntn. Gewachse* **3**, 351 (1804)
This very distinctive, pantropical lichen has a smooth, pale brown thallus and rather large and prominent pseudostromata containing 5–15 ascomata embedded in an orange powdery material that is K+ purple. The ascospores are colourless, elongate fusiform, 9–13-septate and c. 35–50 × 8–12 µm. It is common in north-eastern Australia and New Guinea; among the Pacific islands it has been reported from New Caledonia and the Galapagos Islands (Elix & McCarthy 1998). For further information, see Harris (1986, 1995).

SPECIMEN EXAMINED
Vanuatu. *Éfaté*: •Iririki I., Port Vila harbour, on semi-exposed mango stem in monsoon forest, *H. Streimann 61992 & P. Ala*, 15.x.1998 (CANB).

10. **Trypethelium variolosum** Ach., *Syn. Meth. Lich.* **104** (1814)
This pantropical lichen has a smooth, pale yellowish green, UV+ bright yellow thallus and whitish, irregular pseudostromata each with 5–20 simple, immersed pseudothecia (only the minute, black apices visible). The ascospores are colourless, 3-septate and c. 21–28 × 8–10 µm. In the Pacific it is known from Guam and the Northern Mariana Islands (Elix & McCarthy 1998). For further information, see Harris (1986, 1995).

SPECIMENS EXAMINED
Vanuatu. *Espíritu Santo*: •logging area near Lavatmas, 48 km NNW of Luganville, 15°07'S, 167°01'E, alt. 300 m, in lowland forest, *H. Streimann 62774, 62793 & P. Ala*, 22.x.1998 (CANB).

References

Elix, JA; McCarthy, PM (1998): Catalogue of the lichens of the smaller Pacific islands. *Bibliotheca Lichenologica* **70**, 1–361.

Harris, RC (1986) ["1984"]: The family Trypetheliaceae (Loculoascomycetes: lichenized Melanommatales) in Amazonian Brazil. *Acta Amazonica, Supplement* **14**, 55–80.

Harris, RC (1995): *More Florida Lichens including the 10¢ Tour of the Pyrenolichens*. New York: privately published.

Harris, RC (1998): A preliminary revision of *Pseudopyrenula* Müll. Arg. (lichenized Ascomycetes, Trypetheliaceae) with a redisposition of the names previously assigned to the genus. In *Lichenographia Thomsoniana: North American Lichenology in Honour of John W. Thomson* (Glenn, MG; Harris, RC; Dirig, R; Cole, MS, eds): 133–148. Mycotaxon Ltd, Ithaca, New York.

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

McCarthy, PM (1994a): Corticolous species of *Porina* (lichenized Ascomycotina: Trichotheliaceae) in Australia. I. *Nova Hedwigia* **58**, 391–403.

McCarthy, PM (1994b): Corticolous species of *Porina* (lichenized Ascomycotina: Trichotheliaceae) in Australia. II. *Nova Hedwigia* **59**, 509–516.

McCarthy, PM (1995): A reappraisal of *Clathroporina* Müll. Arg. (Trichotheliaceae). *Lichenologist* **27**, 321–350.

McCarthy, PM; Elix, JA (2000): Additional lichen records from Oceania. 4. Some pyrenolichens in Fiji. *Australasian Lichenology* **46**, 40–42.

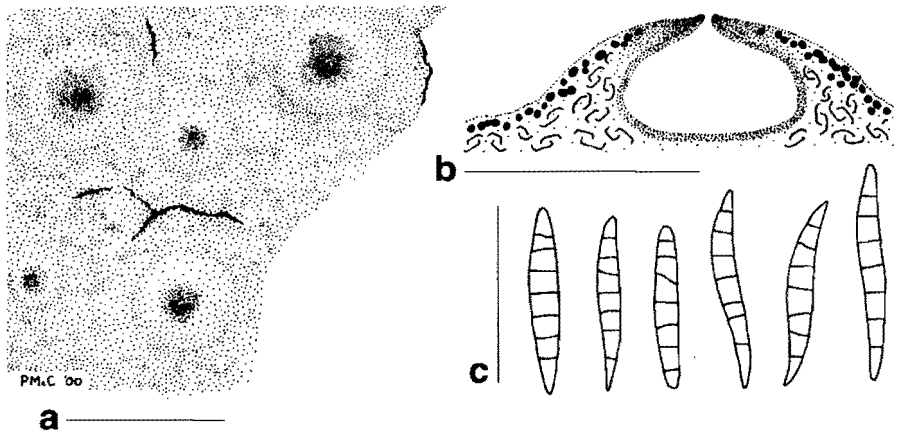

Fig. 1. *Porina mastoidella* (CANB). **a**, Habit of thallus and perithecia; **b**, Part of vertical section of perithecium and adjacent thallus (semi-schematic); **c**, Ascospores. Scales **a** = 0.5 mm, **b** = 0.2 mm, **c** = 20 µm.

Additional lichen records from New Zealand 32. *Epigloea soleiformis* Döbbeler and *Fuscidea impolita* (Müll. Arg.) Hertel

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Henry A. Imshaug and Richard C. Harris collected lichens from Campbell Island, New Zealand, during the summer of 1969–1970. This extensive collection of *c.* 3000 specimens is housed in the herbarium of Michigan State University (MSC), and has recently been reactivated with the aid of a grant from the US National Science Foundation (Award No. DBI-9808735, Alan Prather-PI) (Fryday 2000). Many of the collections received only a cursory examination at the time of collection, and a more thorough examination has revealed several taxa new to science. These are currently under investigation, and will be fully reported elsewhere. A smaller number represent previously described taxa which are new to the New Zealand lichen flora (Malcolm & Galloway 1997, D. Galloway pers. comm.), and two of these are reported here.

Epigloea soleiformis Döbbeler, *Beiheft zur Nova Hedwigia* **79**, 229 (1984)

Epigloea soleiformis is an inconspicuous pyrenocarpous fungus parasitizing gelatinous algal colonies on decaying bryophytes in damp habitats. It is probably much more frequent than records suggest, because it is usually collected as an incidental associate of another species and noticed only later under the binocular microscope.

Epigloea soleiformis was collected several times from Marion Island by Hertel (Döbbeler 1984). In the Northern Hemisphere it is apparently widespread in Europe, but has yet to be recorded from North America.

The Campbell Island specimen was growing over bryophytes with *Stereocaulon caespitosum* Redinger and three apparently undescribed species of the genera *Micarea* (B.J. Coppins pers. comm.), *Poeltinula*, and *Rhizocarpon*.

SPECIMEN EXAMINED

Campbell Island. •Summit of Mt Honey, 570 m, rock outcrops and feldmark, 31.xii.1969, *H.A. Imshaug 46352* (MSC).

Fuscidea impolita (Müll. Arg.) Hertel, *Beiheft zur Nova Hedwigia* **79**, 454 (1984)
Basionym: *Lecidea impolita* Müll. Arg., *Mission Sci. Cap Horn* **5**: 165 (1889) ["1888"].

These collections appear to be the first since the type was collected in Tierra del Feugo in 1882–1883. The species is characterized by a thin, continuous thallus lacking lichen substances (as detected by tlc) but with an amyloid medulla (I+ blue) and ± immersed apothecia.

Although the original description by Müller (1889) gives the ascospores as 11–13 µm long, and Hertel (1984) gives them as 9–14 × 6–8 µm, the Campbell Island specimens have ascospores measuring 9–9.5 × 4.5–6 µm. The apothecia of the Campbell Island specimen also rarely exceed 0.2 mm diam., although Müller gives the diameter as 0.3–0.4 mm.

The only other members of the genus *Fuscidea* having an amyloid medulla are *F. submollis* Inoue (from Japan) and *F. lowensis* (H. Magn.) R.A. Anderson & Hertel and the recently described *F. thomsonii* Brodo & Wirth (Brodo & Wirth 1998) (both from North America). *Fuscidea lowensis* and *F. submollis* both have a thick thallus with sessile apothecia, but *F. thomsonii* is very similar to *F. impolita*, from which it differs primarily in containing divaricatic acid. *Fuscidea impolita* and *F. thomsonii* also have non-moniliform paraphyses and small, broadly ellipsoid ascospores.

A more critical investigation of additional specimens (including the types, which I have not seen) is required to clarify the relationship between *F. impolita* and *F. thomsonii*.

SPECIMENS EXAMINED

Campbell Island. •Rock outcrops and feldmark on summit of Mt Dumas (500 m), 13.i.1970, *H.A. Imshaug 46993* (MSC). •Outcrops above Venus Cove on lower part of W slope of Mt Honey, 15.i.1970, *H.A. Imshaug 47096* (MSC).

References

Brodo, IM; Wirth, V (1998): The lichens and lichenicolous fungi of the Queen Charlotte Islands, British Columbia, Canada. 4. The genus *Fuscidea* (Fuscidiaceae). In *Lichenographia Thomsoniana*: North American Lichenology in Honor of John W. Thomson. MG Glenn, RC Harris, R Dirig & MS Cole (eds), pp. 149–161. Mycotaxon Ltd, Ithaca.

Döbbeler, P (1984): Symbiosen zwischen Gallertalgen und Gallertpilzen der Gattung *Epigloea* (Ascomycetes). *Beiheft zur Nova Hedwigia* **79**, 203–239.

Fryday, AM (2000): Additional lichen records from New Zealand 31. *Australasian Lichenology* **46**, 36–39.

Hertel, H (1984): Über saxicole, lecideoide Flechten der Subantarktis. *Beiheft zur Nova Hedwigia* **79**, 399–499.

Malcolm, WM; Galloway, DJ (1997): *New Zealand Lichens. Checklist, Key, and Glossary*. Museum of New Zealand Te Papa Tongarewa, Wellington.

Müller, J (1889) ["1888"] Lichens. *Mission Sci. Cap Horn* **5**, 141–172.

Additional lichen records from Australia 44. *Dictyographa cinerea* (C. Knight & Mitt.) Müll. Arg.

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During an examination of twigs for species of Graphidaceae other than the apparently ubiquitous *Phaeographis australiensis* Müll. Arg., an inconspicuous specimen was collected that resembled *Opegrapha*. However, the ascospores of *Opegrapha* are transseptate, whereas those of this specimen were muriform, and reference to Galloway (1985) showed it to be *Dictyographa cinerea* Müll. Arg. This is the first report of the genus in Australia.

Dictyographa cinerea (C. Knight & Mitt.) Müll. Arg., *Bull. Herb. Boissier* **2** (appendix 1), 78 (1894)
= *Opegrapha cinerea* C. Knight & Mitt., *Trans. Linn. Soc. London* **23**: 101 (1860).

TYPE: NEW ZEALAND. Auckland, on trees, C. Knight; lectotype: BM (Hayward 1977: 576).

DESCRIPTION: Thallus corticolous, thin to evanescent, off-white; apothecia lirellate, inconspicuous, black, somewhat shiny, lacking a thalline margin, lips closed, producing a conspicuous groove along the length of the lirellae, straight or slightly curved, unbranched, 0.5–1.2 mm long, 0.3–0.5 mm wide; proper exciple thick, completely carbonised; hymenium 120–140 µm tall; ascospores 8 per ascus, ellipsoid, hyaline, muriform, 24–28 µm long, 10–12 µm wide, 6–7 × 2–4-locular. Chemistry: no compounds found.

SPECIMEN EXAMINED
Australia. *New South Wales*: •Kuringai Chase National Park, Pittwater, The Basin camping area, 33°36'15"S, 151°17'30"E, alt. 2 m, *c.* 30 km N of Sydney, on fallen twig, *A.W. Archer G 498*, 3.vi.2000 (NSW 441142).

Dictyographa cinerea is characterised by the sessile, black, simple lirellae, the thick, completely carbonised proper exciple, the hyaline, muriform ascospores and the absence of lichen compounds. With a thin or evanescent thallus and small, black lirellae, the species is inconspicuous and readily overlooked. The description above, based on the Australian specimen, agrees with that given by Hayward (1977: 576) for the New Zealand specimens. Associated taxa were *Phaeographis australiensis, Pertusaria* sp. and *Lecanora* sp.

Dictyographa is a genus of *c.* 5 species of mainly tropical distribution included in the family Roccellaceae (Hawksworth *et al.* 1995). One of these species, *D. psyllocarpa* (Leight.) Redinger, described from Brazil (Redinger 1940), has lirellae and ascospores closely resembling those of *D. cinerea*.

References
Galloway, DJ (1985): *Flora of New Zealand Lichens*. Government Printer, Wellington.
Hawksworth, DL; Kirk, PM; Sutton, BC; Pegler, DN (1995): *Ainsworth & Bisby's Dictionary of the Fungi*. CAB International, Wallingford.
Hayward, GC (1977): Taxonomy of the lichen families Graphidaceae and Opegraphaceae in New Zealand. *New Zealand Journal of Botany* **15**, 565–584.
Redinger, K (1940): Die Graphidineen der ersten Regnell'schen Expedition nach Brasilien 1892–94. IV. *Opegrapha*. *Arkiv för Botanik* **29A**(19), 1–52.

Additional lichen records from Australia 45. The lichen family Calycidiaceae discovered in Tasmania

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Abstract: *Calycidium cuneatum* Stirt. is recorded for Tasmania for the first time. The morphology, chemistry and ecology of Tasmanian specimens are discussed.

Introduction
The family Calycidiaceae M. Choisy comprises the single, currently monotypic genus *Calycidium* Stirt. and is included in the Order Caliciales, a heterogeneous assemblage of superficially quite different genera that all display passive spore dispersal via the development of mazaedia (Tibell 1984). The Australasian flora is rich in Caliciales, notably the prominent fruticose genera *Bunodophoron, Leifidium* and *Sphaerophorus*, common components of cool temperate rainforest, and the minute crustose genera *Chaenotheca, Calicium* and their relatives that are prominent on dead, dry lignum, especially in sclerophyll forest. Although superficially not unlike *Bunodophoron* (Sphaerophoraceae) and even included there by some early authors, for example Murray (1960), *Calycidium* is today retained in a separate family on account of its sessile, dark brown ascomata and pigmented ascospores that lack ornamentation or sterile, sclerotized material (Ohlsson 1974, Tibell 1984).

Originally described from and considered to be endemic to New Zealand (Galloway 1985, Tibell 1987), *Calycidium* was collected in southern South America by B.J. Coppins, D.J. Galloway, G. Guzmán and P.W. James in 1986, and subsequently by other lichenologists also. Despite extensive field work in Tasmania over the last 20 years, focused especially on cool temperate rainforest where *Calycidium* can be expected to occur, the genus appeared to be absent there. However, recently two widely separated localities for the genus were discovered. These represent a significant range extension and the first records of a family previously not known for Australia.

Calycidium cuneatum Stirt., *Proc. Phil. Soc. Glasgow* **10**: 292 (1877)
Type: [New Zealand] Chatham Islands, *Travers* (BM, not seen).

Comprehensive descriptions of this species are provided by Galloway (1985) and Tibell (1987). It is characterised by erect to ascending markedly flattened lobes, 4–10 mm wide and up to 15 mm long, green to greyish or yellowish green upper surface, whitish lower surface, marginal, numerous, brown to dark brown mazaedia, and irregularly globose, 4–7 µm diam. to irregularly ellipsoid, 6–7 × 4.5–6 µm ascospores (Fig. 1).

Superficially *C. cuneatum* resembles the broad, basal, sterile branches of certain species of *Bunodophoron*, particularly *B. macrocarpum* or *B. scrobiculatum*. Indeed at one locality all three taxa were present. In the field, it can be easily distinguished from these taxa by the presence of abundant, marginal, dark brown mazaedia, whereas those of the *Bunodophoron* species are black and are conspicuously elevated on specialised flattened or terete branches. Furthermore, the mazaedia of *C. cuneatum* have a thin thalline margin, whereas those of most *Bunodophoron* species are contained within a prominent thalline receptacle.

The chemistry of the two Tasmanian specimens is markedly different. Both contain an unidentified slow-moving substance that is colourless on developed TLC plates, but whereas one (*GK 462/99*) contains additional sphaerophorin, the other (*GK 263/00*) contains unidentified, fast-moving xanthones, appearing as UV+ orange spots on undeveloped plates. The South American specimen to which these were compared has the latter chemistry.

Dr Mats Wedin of Umeå, Sweden, has indicated (*in litt.*) that the two chemistry types are correlated to subtly different morphologies, most notably lobe form and apothecial size, and it is his intention to erect a second species in the genus in a forthcoming paper. The putative morphological differences could not be observed in the Tasmanian collections, but it appears that ultimately the Tasmanian flora will include the full complement of known species of *Calycidium*. Both taxa also occur in New Zealand, whereas only one is known from South America.

Although both Tasmanian specimens were discovered in cool temperate rainforest, their ecology was markedly different. The sphaerophorin-containing specimen occurred in a very low, tangled rainforest community at subalpine altitudes (950 m), a forest type referred to as *implicate* by Jarman *et al.* (1994). It grew on the smooth bark of a young, horizontally orientated limb of *Nothofagus cunninghamii*, associated with species of *Bunodophoron, Leifidium tenerum* and numerous crustose lichens such as *Miltidea ceroplasta* and *Megalospora lopadioides*. In contrast, the xanthone-containing specimen occurred in tall, open, park-like rainforest of the *callidendrous* type (Jarman *et al.* 1994) at only 70 m altitude, and grew on an ancient tree of *Nothofagus cunninghamii* at the forest edge, associated with bryophytes, *Bunodophoron insigne* and *B. australe*. The extent to which these lichens are faithful to these habitats will only be revealed by further collections, although it has been shown that the lichen floras of these forest types can be significantly different (Jarman & Kantvilas 1995).

Calycidium is thus a classical austral cool temperate genus, with a distribution confined to the southernmost fragments of the former supercontinent of Gondwana, and with an ecological distribution centred in the cool temperate *Nothofagus*-dominated rainforests of the region. Similar far southerly distributions are expressed by the small genera *Sagenidium*, *Roccellinastrum* and *Kantvilasia*.

SPECIMENS EXAMINED

Tasmania: •Hartz Lake, 43°14'S, 146°46'E, 950 m altitude, 30.xii.1999, *G. Kantvilas 462/99* (HO); •along the road to Corinna, south of the Pieman River, 41°40'S, 145°05'E, 70 m altitude, 23.v.2000, *G. Kantvilas 263/00* (HO). **Chile**: •11.4 km SW of Choshuenco near Rio Enco, 39°53'S, 72°08'W, 400 m altitude, 24.xi.1986, *B.J. Coppins et al. 4086* (BM, HO).

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References

Galloway, DJ (1975): *Flora of New Zealand Lichens*. Government Printer, Wellington.

Jarman, SJ; Kantvilas, G (1995): A floristic study of rainforest bryophytes and lichens in Tasmania's myrtle-beech alliance. Tasmanian NRCP Report No. 14. Forestry Tasmania and Department of the Environment, Sport and Territories, Canberra.

Jarman, SJ; Kantvilas, G; Brown, MJ (1994): Phytosociological studies in Tasmanian cool temperate rainforest. *Phytocoenologia* **25**, 355–390.

Murray, J (1960): Studies of New Zealand lichens. I. The Coniocarpinae. *Transactions of the Royal Society of New Zealand* **88**, 177–195.

Ohlsson, K (1974): A revision of the lichen genus *Sphaerophorus*. Unpublished PhD Thesis, Michigan State University.

Tibell, L (1984): A reappraisal of the taxonomy of Caliciales. *Beiheft zur Nova Hedwigia* **79**, 597–713.

Tibell, L (1987): Australasian Caliciales. *Symbolae Botanicae Upsalienses* **27**(1), 1–279.

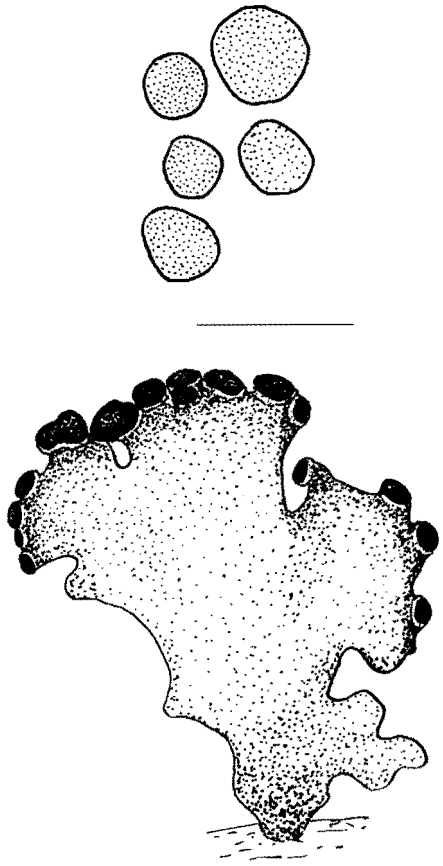

Fig. 1. *Calycidium cuneatum* (*GK 263/00*). Single lobe of thallus with numerous marginal mazaedia, and ascospores. Scale = 4 mm for the thallus and 10 µm for the ascospores.