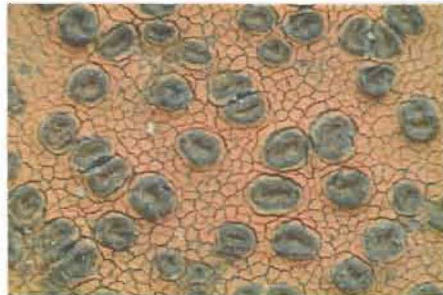


Australasian Lichenology

Number 50, January 2002



5 mm

5 mm

Tremolecia atrata (Ach.) Hertel. This cosmopolitan crustose lichen is locally common on exposed siliceous rocks in upland areas of both hemispheres. It's characterized by a rust-coloured thallus, coal-black apothecia with a massive excipulum, and an ascus with a thin I+ blue outer gelatinous layer and a well-developed tholus reacting I- or weakly I+ blue and lacking a distinct ocular chamber.

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OBITUARY

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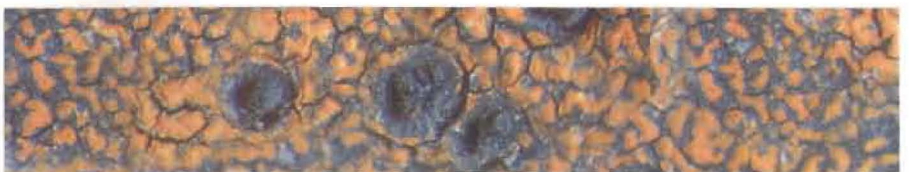
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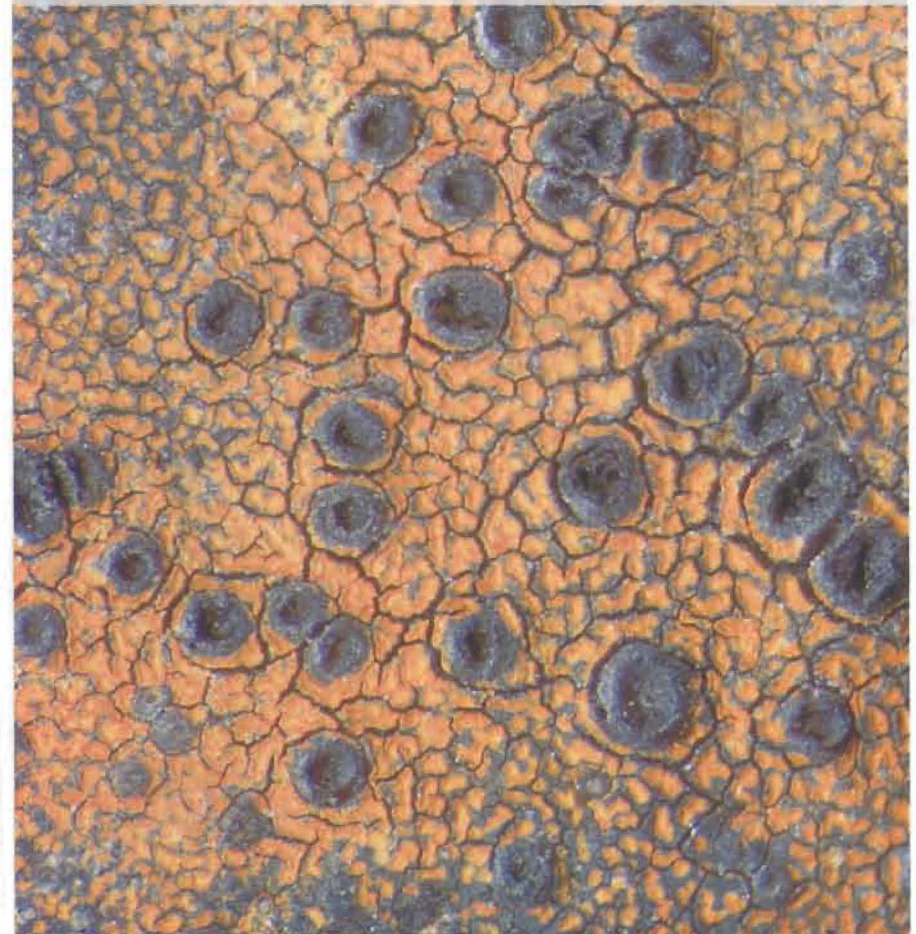
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15TH MEETING OF AUSTRALASIAN LICHENOLOGISTS—2002

The 15th meeting of the Australasian Lichenologists will be held at the Neighbourhood Centre, Gardiner Crescent, Blackheath, on Saturday and Sunday, the 20th and 21st of April, 2002.

On Saturday, talks will be presented on various aspects of lichen chemistry, ecology, and biogeography. The afternoon session will be taken up with a discussion of ABRs publications, backlogs in herbaria, and progress with the listing of threatened lichen communities. A group dinner is planned for the evening. On Sunday, we will visit two lichen habitats near Blackheath.

There is a range of styles of accommodation at Blackheath—backpacker, pubs, cabins, bed and breakfast, hotels, motels, and resorts. However, Blackheath is a popular destination from Sydney, and it would be wise to book early. If you wish to register or to present a talk, or if you would like an information package on accommodation and other details, please contact David Eldridge at:

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e-mail: alanw.archer@bigpond.com

JACK ELIX FESTSCHRIFT

Jack Elix has been presented with his personal copy of *Lichenological Contributions in Honour of Jack Elix, Bibliotheca Lichenologica* Volume 78, edited by Patrick McCarthy, Gintaras Kantvilas, and Simone Louwhoff. The volume includes contributions from 56 lichenologists, with papers on taxonomy, systematics, phylogeny, biogeography, floristics, chemistry, and history. In all, about 50 new taxa are described, plus many new combinations made and new national records reported. It has a strong Australasian emphasis (*see* RECENT LITERATURE ON AUSTRALASIAN LICHENS, Volume 49 of *Australasian Lichenology*).

The presentation was a low-key affair following dinner with good wine at a nice restaurant—the elegantly wrapped book was handed to Jack during coffee and profiteroles. He was most appreciative (and truly taken by surprise—in spite of several alarming “near misses”, the editors managed to keep the volume secret during the many months of its preparation).

COVER ILLUSTRATION

Tremolecia atrata (Ach.) Hertel. This distinctive rust-coloured crustose lichen is widespread in upland regions of both hemispheres, particularly in iron-rich areas and on mine tailings. First described in 1808 by Acharius as a species of *Cyalecta*, it was transferred to *Tremolecia* in 1977 by Hertel (*see also* back cover).



photograph by Jack Elix

Heinar Streimann was born on December 19, 1938, in Tartu, Estonia, and his early life was shaped by the events of World War II. His father, serving in the air force, was killed in the fighting, and his family, including his mother, grandmother and brother, were forced to flee their native Estonia towards the end of the war. They made their way to Oldenburg in Germany to begin a new life, and it was in Oldenburg that Heinar began his schooling, before immigrating to Australia with his family in the winter of 1950. There he settled in Seymour, Victoria, where he completed his matriculation at Seymour High School before moving to Melbourne to take a job with the Bureau of Meteorology. In 1961 he moved again, this time venturing to Papua New Guinea where he worked in the forestry industry. His particular job involved surveying, planning and building roads for the expanding industry. It was in Papua New Guinea that Heinar's love for botany came to the fore. He pursued his new interest with a passion, and eventually began teaching botany at the Forest College in Bulolo. At the same time, he took every opportunity to expand his knowledge of the tropical plants he saw around him every day.

During this period Heinar began to correspond intermittently with a pen pal also interested in collecting postage stamps—her name was Angelina (Lina) from the Philippines. Lina remembers that the letters were long, hard to read because of the handwriting, and sometimes perhaps “a little boring”, but he was persistent

and their correspondence continued. It wasn't until he visited the Philippines in 1965 that their relationship blossomed, and they were married in Manila on July 12, 1965. Theirs was a lifelong friendship that stood the test of time.

Heinar and Lina had three children—Arlene (born in 1968 in Seymour, Victoria), Mirja (born in Lae, PNG, in 1972) and Arvid (born in Manila in 1977). As the different birthplaces of the children attest, Heinar and Lina travelled widely, working in various parts of the world as well as discovering the different things that each place had to offer. Only last year (2000), they spent six months travelling, visiting Egypt, Greece, the US, Finland and Estonia, where Heinar was interested to rediscover his family roots. The desire to travel and explore remained a passion of Heinar's throughout his life.

Apart from his wife and family, Heinar's greatest passion was botany, more particularly cryptogamic botany. In 1973, Heinar departed from Papua New Guinea to take up a position at the Australian National Botanic Gardens in Canberra, where his employment continued (apart from a second stint at the PNG Forest College in Bulolo in 1981–83) until his retirement in April, 2000. It was here that Heinar really established himself as an expert bryologist and collector of mosses, lichens and liverworts. He also completed his tertiary qualifications the hard way—that is, by part-time study as a mature-age student while working full time and supporting his young family. By so doing, he successfully completed his Bachelors Degree (University of Canberra) and Masters Degree (University of New South Wales). During this time, Heinar was primarily responsible for building up the CANB cryptogamic herbarium (formerly CBG) from 14 packets to be the largest and best curated collection of cryptogams in the Southern Hemisphere. He achieved this through individual dedication, perseverance, tenacity, and long hours of work. However, Heinar was never happier than when he was in the ‘bush’, going to new places in search of new or rare mosses, lichens or liverworts. He made many significant scientific contributions in his own published papers, and even more from his meticulous collections. His *Catalogue of Mosses of Australia and its External Territories* [Austr. Flora & Fauna series no. 10, AGPS Canberra, 1989] co-authored with Judith Curnow, is particularly noteworthy. In the field he had an excellent eye for the unusual, and the numerous new species of lichens, mosses, and liverworts described over the last 20 years bearing the epithet *streimannii* bear witness to this. Despite his many achievements, Heinar was a man of great humility.

Quiet and private by nature, Heinar was a very obliging and hospitable person, and an excellent host to our many visiting botanists from around the world. He particularly enjoyed taking visitors in the field—the further and more remote the locality the better. I remember one particular evening when after a very convivial dinner in a local restaurant at ca. 10 p.m., our guest Professor requested “Heinar, now we shall go to the Herbarium...”. Heinar, being the gentleman that he was, not only accompanied her but was happy to do so! He was also more than willing to assist fellow botanists who were in a less privileged position than he, irrespective of whether they were from Estonia, the United States, Papua New Guinea or Vanuatu.

Heinar died on August 29, 2001, after a tough struggle with prostate cancer. I will miss my old friend—and going into the bush without him will not be quite the same—but then again, I expect that he will be waiting there!

Jack Elix

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5-Chlorolecanoric acid, a new depside from *Punctelia* species

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Abstract: The depside 5-chlorolecanoric acid has been detected in extracts of *Punctelia pseudocoralloidea*, *P. subalbicans* and *P. subflava* together with lecanoric acid. *Punctelia pallescens* Kurok. is synonymized with *P. subalbicans*.

Lecanoric acid (1) is a very common orcinol depside, widely distributed in many lichen genera (Huneck & Yoshimura 1996). A number of lecanoric acid derivatives which occasionally co-occur with (1) show a much more restricted taxonomic distribution, and are sometimes genus- or species-specific. Diploschistes acid (3) is one such compound, known only from lichens of the genus *Diploschistes* Norman (Fig. 1). Similarly, 2'-*O*-methylevernic acid (4) has only been found in *Evernia prunastri* (L.) Ach. (Nicollier *et al.* 1979). We have now found that the new depside 5-chlorolecanoric acid (2) appears to be restricted to some species of *Punctelia*. In this paper we describe the unambiguous total synthesis of 5-chlorolecanoric acid (2) and the natural occurrence of this compound together with lecanoric acid (1) in extracts of *Punctelia pseudocoralloidea* (Gyeln.) Elix & Kantvilas, *P. subalbicans* (Stirt.) D.J. Galloway & Elix and *P. subflava* (Taylor) Elix & J. Johnst.

Materials and methods

Chromatography

The lichen fragments were freed as far as possible from obvious organic substratum and extracted with warm acetone for thin layer chromatography (TLC) or with warm methanol for high performance liquid chromatography (HPLC). Compounds were identified by TLC using the methods standardized for lichen products (Culberson 1972, Culberson & Ammann 1979, Culberson & Johnson 1982, Elix & Ernst-Russell 1993) and by HPLC with retention index values (R_I) calculated from benzoic acid and soloninic acid controls (Elix & Wardlaw 2000, Feige *et al.* 1993). For TLC, standard R_F values were determined in three independent TLC solvent systems: (A) toluene : dioxan : acetic acid (180:45:5), (B) hexane : *tert*-butyl methyl ether : formic acid (140:72:18), (c) toluene : acetic acid (170:30). For HPLC, a Spectra 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 of 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.

Lichen material

Punctelia pseudocoralloidea (Gyeln.) Elix & Kantvilas

South Australia: Eyre Peninsula, Marble Range, 28 km SW of Cummins, 34°25'S, 135°30'E, 400 m, on *Casuarina* on rocky ridge with scattered shrubs, *J.A. Elix 41728*, 22.ix.1994 (CANB).

Punctelia subalbicans (Stirt.) D.J. Galloway & Elix

New South Wales: Weddin State Forest, 14 km SW of Grenfell, 34°00'S, 148°01'E, 340 m, on *Callitris columellaris* in *Callitris* woodland, *J.A. Elix 11436* & *H. Streimann*, 8.xi.1983 (CANB).

Western Australia: Dumbleyung to Wagin road, 10 km W of Dumbleyung near Nippering siding, on trunk of *Acacia acuminata*, *R. Filson 9386*, ii.1987 (holotype of *P. pallescens* Kurok. – TNS).

Punctelia subflava (Taylor) Elix & J. Johnst.

New South Wales: Guerrilla Bay, 13 km SE of Batemans Bay, 35°20'S, 150°13'E, sea level, on *Casuarina glauca* along the foreshore, *J.A. Elix 10934*, 18.v.1983 (CANB).

Detection of the new depside by comparative chromatography

Comparative HPLC and TLC of all three species indicated the presence of lecanoric acid (1) (major) and 5-chlorolecanoric acid (2) (minor) [standard TLC R_F values: R_F (A) 0.33; R_F (B) 0.44; R_F (C) 0.29; standard HPLC R_I 0.18; R_T = 21.6 min] and minor quantities of atranorin and chloroatranorin (Fig. 2). The HPLC was coupled to a photodiode array detector for ultraviolet spectroscopic comparisons. By this means, the spectra of the components eluting from the chromatogram were recorded and computer-matched against a library of ultraviolet spectra recorded for the authentic lichen metabolites under identical conditions. For the above substances, the correlation of the ultraviolet spectra was greater than 99.9%.

Synthesis of 5-chlorolecanoric acid

The preparation of the synthetic intermediates 3-chloro-4,6-dibenzyloxy-2-methylbenzoic acid (Sundholm 1978) and benzyl orsellinate (Elix & Norfolk 1975) have been described previously.

A solution of 3-chloro-4,6-dibenzyloxy-2-methylbenzoic acid (190.6 mg, 0.5 mmol) and benzyl orsellinate (129 mg, 0.5 mmol) in anhydrous toluene (4 ml) and trifluoroacetic anhydride (1.3 ml) was stirred at room temperature for 6 h. The solvent was removed, and residual trifluoroacetic anhydride removed by azeotropic distillation with toluene. The residue was purified by radial chromatography over silica gel using 5% to 20% ethyl acetate / light petroleum as eluant. The second band yielded benzyl 2,4-di-*O*-benzyl-5-chlorolecanorate (130.9 mg, 42%) as colourless crystals, m.p. 123–125°. ^1H n.m.r. [CDCl_3] δ 2.44, 2.45, 2s, ArMe; 5.04, 5.14, 2s, OCH₂; 5.40, s, CO₂CH₂; 6.40, 6.63, 2d, *j* 2.3 Hz, H3', H5'; 6.50, s, H3; 7.32–7.52, m, C₆H₅, 11.53, s, OH. Mass spectrum *m/z* 622 (M, 0.3%), 367 (25), 366 (16), 365 (60), 181 (10), 92 (15), 91 (100). A solution of benzyl 2,4-di-*O*-benzyl-5-chlorolecanorate (72 mg) in ethyl acetate was stirred with 10% palladium on carbon (70 mg) in an atmosphere of hydrogen for 17 h. After filtration and concentration of the solution, 5-chlorolecanoric acid (34 mg, 83%) was obtained as colourless crystals m.p. 178–180° (Found: mol. wt. 352.0343. C₁₆H₁₃ClO₇ requires mol. wt. 352.0349). ^1H n.m.r. [(CD₃)₂CO] δ 2.63, 2.67, 2s, ArMe; 6.55, s, H3; 6.77, 6.80, 2d, *j* 2.3 Hz, H3', H5'. Mass spectrum *m/z* 352 (M, 4.5%), 187 (32), 186 (15), 185 (100), 184 (21), 168 (24), 151 (32), 150 (61), 124 (13), 123 (13), 122 (41), 121 (10).

Discussion and results

The natural occurrence of 5-chlorolecanoric acid (2) in the extracts of *Punctelia pseudocoralloidea*, *P. subalbicans* and *P. subflava* has now been confirmed. Comparisons were conducted among the synthetic depside (2), the total acetone extracts of the *Punctelia* species by TLC in four independent solvent systems, and by HPLC coupled to a photodiode array detector for ultraviolet spectroscopic comparisons. The HPLC of such an extract is shown in Fig. 2. By these means, the *Punctelia* species were shown to contain lecanoric acid (1) (major), 5-chlorolecanoric acid (2) (minor), atranorin (minor) and chloroatranorin (minor). Recently Kurokawa (1999) described *Punctelia pallescens* Kurok. from Western Australia, a species distinguished by the occurrence of an "unknown" substance in addition to lecanoric acid. We have now confirmed that this unknown substance is identical with 5-chlorolecanoric acid, and that the type material of *P. pallescens* is morphologically and chemically indistinguishable from *P. subalbicans*.

Acknowledgement

We thank Dr H. Kashiwadani (TNS) for organizing the loan of the type material of *Punctelia pallescens*.

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	R ₁	R ₂	R ₃	R ₄
(1)	H	H	H	H
(2)	H	H	Cl	H
(3)	OH	H	H	H
(4)	H	CH ₃	H	CH ₃

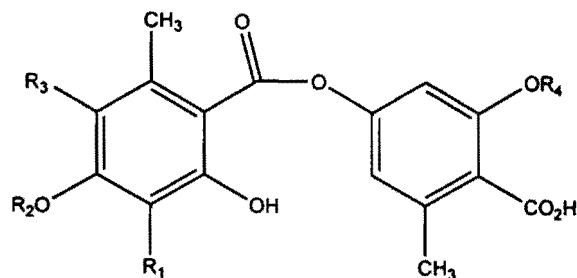


Fig. 1. Structure of depsides.

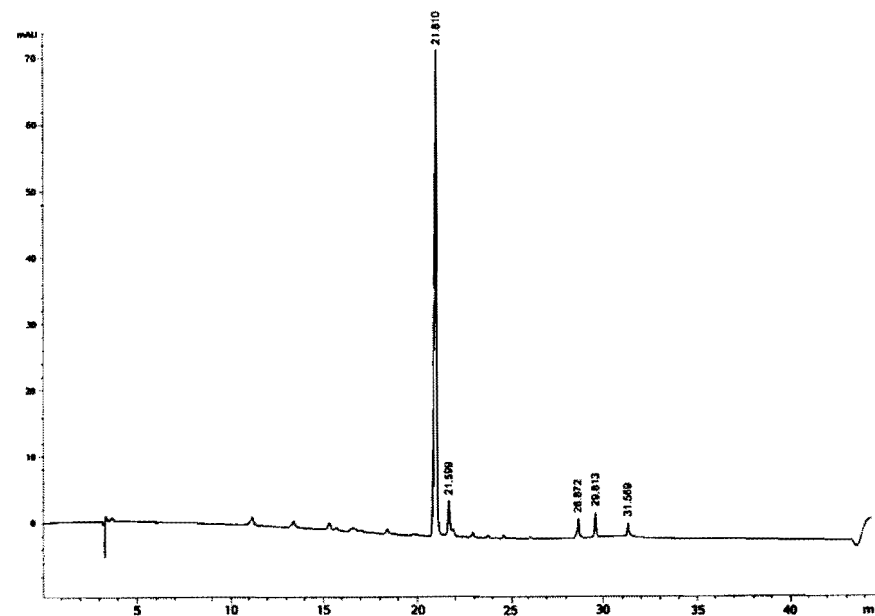


Fig. 2. HPLC of acetone extract of *Punctelia subalbicans* (J.A. Elix 11436). R_T 20.810 = lecanoric acid, R_T 21.599 = 5-chlorolecanoric acid, R_T 28.872 = atranorin, R_T 20.813 = chloroatranorin, R_T 31.569 = internal standard.

**Additional lichen records from Australia 48.
Miscellaneous taxa in Christmas Island**

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Abstract: Sixty lichens are reported for the first time from Christmas Island in the north-eastern Indian Ocean. Eight are new records for Australian territory.

Introduction

In July and August 2000, P.M. McCarthy and Heino Lepp visited Christmas Island in the north-eastern Indian Ocean (Fig. 1) and made a large collection of lichens. Subsequently, four new pyrenocarpous taxa were described, and 12 others were reported for the first time from Australian territory (McCarthy 2001b, c, e).

The following miscellany mainly comprises pantropical and broadly Palaeotropical taxa with smaller numbers of more locally distributed and cosmopolitan species: it brings the number of lichens confirmed from the island to 97 (Table 1). However, this does not include at least 10 unidentified species each of Graphidaceae, Thelotremaaceae, Pyrenulaceae and other saxicolous and corticolous pyrenolichens, as well as numerous sterile and apothecial crusts on limestone, bark, soil and leaves. The addition of 50 or more taxa that were not collected during our visit (a conservative estimate considering the forest canopy flora and much of the southern half of the island remain largely unexplored) would bring the total close to 250.

Eight lichens are reported for the first time from Australian territory: *Calopadia nymanii*, *Canoparmelia adspersa*, *Enterographa deslooveri*, *Opegrapha* aff. *vegae*, *Phyllopsora breviuscula* var. *javanica*, *Pyrenula concatervans*, *Ramalina zollingeri* and *Verrucaria* aff. *fuscella*.

All of the specimens listed below are held in CANB. For information on the climate, topography and vegetation of Christmas Island, see Du Puy (1993) or McCarthy (2001b).

Table 1. Distribution types of lichens reported here and recently (McCarthy 2001b, c, e) from Christmas Island.

± Cosmopolitan.....	7 taxa
Pantropical.....	56
Palaeotropical-W Pacific.....	18
Regional [SE Asia, Malesia and tropical Australia].....	10
Local [Christmas Island and Java].....	6
TOTAL.....	97

The Species

Arthothelium aff. **ampliatum** (C. Knight & Mitt.) Müll. Arg., *Bull. Herb. Boissier* 2, append. 1, 85 (1894)

The well-developed specimen has a rather thick, pale grey, uneven to papillose thallus with irregular to rounded, convex to sessile, immarginate ascomata that are 0.3–1 mm wide and medium pinkish grey-brown to dark brown. The non-amyloid hymenium is dominated by large, thick-walled, subglobose asci with 4–8 ascospores. The latter are narrowly ellipsoidal to clavate, thick-walled, have the upper third to half occupied by a single cell, with the remainder muriform; they measure 45–56 × 15–26 µm and are hyaline, although some become medium to dark brown after maturity.

At least six species of *Arthothelium* with ascospores of this distinctive type have been reported from India, tropical Australia, New Guinea and the Philippines. However, most have smaller ascospores, and none possesses this combination of a well-developed thallus and small, simple, prominent and comparatively pale ascomata.

SPECIMEN EXAMINED

•Murray Rd, 3.3 km NNE of Central Area Workshop, 10°27.36'S, 105°39.24'E, alt. 220 m, on bark in moderately dense primary forest, *McCarthy 1610*, 26.vii.2000.

Bacidina pallidocarnea (Müll. Arg.) Vězda, *Folia Geobot. Phytotax.* 25, 432 (1990)

This pantropical lichen is already known from north-eastern New South Wales.

SELECTED SPECIMENS EXAMINED

•1.5 km SW of Central Area Workshop, 10°28.89'S, 105°37.11'E, alt. 240 m, on leaves in moderately dense primary forest, *McCarthy 1406* (part) 27.vii.2000; •track to Margaret Knoll Lookout, 250 m SSW of Gannet Hill, 10°28.44'S, 105°40.98'E, alt. c. 250 m, on leaves in moderately dense primary forest, *McCarthy 1724*, 2.viii.2000.

Brigantiaea leucoxantha (Spreng.) R. Sant. & Hafellner, in Hafellner & Belle-mère, *Nova Hedwigia* 35, 246 (1981)

This common, tropical and subtropical lichen was collected at one locality in Christmas Island.

SPECIMEN EXAMINED

•Irvine Hill Rd, 800 m SW of Irvine Hill, 10°26.62'S, 105°40.33'E, alt. 290 m, on bark of isolated tree in fern-dominated secondary growth, *McCarthy 1624*, 24.vii.2000.

Byssoloma leucoblepharum (Nyl.) Vain., *Dansk Bot. Arkiv* 4, 23 (1926)

This species occurs in most tropical and subtropical regions.

SELECTED SPECIMENS EXAMINED

•700 m N of Grants Well, 10°28.52'S, 105°39.14'E, alt. 260 m, on leaves in moderately dense primary forest, *McCarthy 1720*, 28.vii.2000; •West White Beach walking track, 10°28.25'S, 105°34.76'E, alt. 270 m, on branches, at margin of moderately dense primary forest, *McCarthy 1721*, 27.vii.2000.

Byssoloma subdiscordans (Nyl.) P. James, *Lichenologist* 5, 126 (1971)

This cosmopolitan lichen grows on bark, rock and leaves. It is very abundant on forest leaves at one locality near the east coast of Christmas Island.

SPECIMENS EXAMINED

•Track to Margaret Knoll Lookout, 250 m S of Gannet Hill, 10°28.45'S, 105°41.05'E, alt. c. 250 m, on leaves in moderately dense primary forest, *McCarthy 1412*, *1414*, 2.viii.2000.

Calenia phyllogena (Müll. Arg.) R. Sant., *Symb. Bot Upsal.* 12(1), 349 (1952)

This pantropical lichen is also known in north-eastern Queensland.

SPECIMENS EXAMINED

•Irvine Hill Rd, old track to Hanitch Hill, 10°26.77'S, 105°40.22'E, alt. 275 m, on leaves in dense primary forest, *McCarthy 1389, 1390, 1725*, 24.vii.2000; •1.7 km ESE of Jacks Hill, 10°29.00'S, 105°36.53'E, alt. 240 m, on leaves in dense primary forest, *McCarthy 1662* (part), 27.vii.2000.

Calopadia fusca (Müll. Arg.) Vězda, *Folia Geobot. Phytotax.* 21, 215 (1986)

This pantropical lichen is also known in north-eastern Queensland.

SPECIMENS EXAMINED

•1.5 km SW of Central Area Workshop, 10°28.89'S, 105°37.1'E, alt. 240 m, on leaves in moderately dense primary forest, *McCarthy 1406* (part), 27.vii.2000; •2 km ESE of Jacks Hill, 10°28.94'S, 105°36.65'E, alt. 240 m, on leaves in moderately dense primary forest, *McCarthy 1547* (part), 27.vii.2000.

Calopadia nymanii (R. Sant.) Vězda, *Folia Geobot. Phytotax.* 21, 215 (1986)

The Christmas Island specimens have pale greenish grey thalli, prominent apothecia, 0.4–0.9 mm diam., with a constricted base, a rough, somewhat concave, very dark brown, non-pruinose disc and a paler margin that soon becomes excluded. The epithecium is pale yellowish brown, the paraphyses are loosely anastomosing and the hypothecium is dark red-brown. The asci are (4–)8-spored, and the elongate-cylindrical ascospores are 75–100 × 8–11 µm with 15–25 transverse septa: most cells have one longitudinal septum. This lichen also occurs in Java and New Guinea (Santesson 1952).

SPECIMENS EXAMINED

•North-South Baseline Rd, 1 km S of airport, 10°27.64'S, 105°41.24'E, alt. 230 m, on leaves in moderately dense primary forest, *McCarthy 1670, 1674*, 31.vii.2000.

Calopadia phyllogena (Müll. Arg.) Vězda, *Folia Geobot. Phytotax.* 21, 215 (1986)

This pantropical lichen is also known in north-eastern Queensland.

SPECIMEN EXAMINED

•1.5 km SW of Central Area Workshop, 10°28.89'S, 105°37.1'E, alt. 240 m, on leaves in moderately dense primary forest, *McCarthy 1407* (part), 27.vii.2000.

Canoparmelia adspersa (Vain.) Elix & Hale, in Elix *et al.*, *Mycotaxon* 27, 278 (1986)

Previously known from Thailand and the Philippines, a new combination in *Parmotrema* is imminent (Elix *et al.* 2002).

SPECIMEN EXAMINED

•Track to Margaret Knoll Lookout, 200 m WSW of Gannet Hill, 10°28.33'S, 105°40.96'E, alt. c. 250 m, on fallen canopy twigs in moderately dense primary forest, *McCarthy 1505A*, 2.viii.2000.

Chrysothrix candelaris (L.) J.R. Laundon, *Lichenologist* 13, 110 (1981)

This cosmopolitan, usually sterile, leprose lichen was abundant on a tree-trunk at a comparatively open site near the east coast of Christmas Island.

SPECIMEN EXAMINED

•Track to Greta Beach, near 2WD car-park, 10°29.62'S, 105°40.70'E, alt. 70 m, on bark of track-side tree, *McCarthy 1625*, 2.viii.2000.

Coenogonium flavicans (Vězda & Farkas) Kalb & Lücking, in Lücking & Kalb, *Bot. Jahrb. Syst.* 122, 32 (2000)

This pantropical lichen is also known from eastern New South Wales.

SELECTED SPECIMENS EXAMINED

•Murray Rd, near entrance to National Park, 10°27.10'S, 105°39.45'E, alt. 200 m, on leaves in moderately dense primary forest, *McCarthy 1648*, 26.vii.2000; •near North-South Baseline Rd, c. 2 km SSW of airport, disused forest track, 10°28.23'S, 105°40.83'E, alt. 240–250 m, on leaves in moderately dense primary forest, *McCarthy 1658* (part), 31.vii.2001; •2 km ESE of Jacks Hill, 10°28.94'S, 105°36.65'E, alt. 240 m, on leaves in moderately dense primary forest, *McCarthy 1591*, 27.vii.2000.

Coenogonium subluteum (Rehm) Kalb & Lücking, in Lücking & Kalb, *Bot. Jahrb. Syst.* 122, 34 (2000) Syn.: *Dimerella epiphylla* (Müll. Arg.) Malme.

This pantropical lichen is also known from eastern Queensland and New South Wales.

SELECTED SPECIMENS EXAMINED

•Irvine Hill Rd, old track to Hanitch Hill, 10°26.77'S, 105°40.22'E, alt. 275 m, on leaves in dense primary forest, *McCarthy 1691*, 24.vii.2000; •pipeline track from Murray Rd, 1.5 km NE of Central Area Workshop, 10°28.01'S, 105°38.33'E, alt. 230 m, on leaves in moderately dense primary forest, *McCarthy 1661A*, 26.vii.2000; •The Dales, directly above Hugh's Dale Waterfall, 10°28.78'S, 105°33.59'E, alt. 100 m, on leaves in sparse primary forest, *McCarthy 1651*, 1.viii.2000.

Cresponea plurilocularis (Nyl.) Egea & Torrente, *Mycotaxon* 48, 322 (1993)

This appears to be a rather common lichen in the eastern Palaeotropics and the western Pacific.

SPECIMEN EXAMINED

•Track to Greta Beach, near 2WD car-park, 10°29.62'S, 105°40.70'E, alt. 70 m, on bark of track-side tree, *McCarthy 1624*, 2.viii.2000.

Dichosporidium boschianum (Mont.) Thor, *Opera Bot.* 103, 64 (1990)

This byssoid Palaeotropical lichen is locally abundant on the trunks and branches of large forest trees. Its distribution includes the Northern Territory and Queensland.

SELECTED SPECIMENS EXAMINED

•Murray Rd, near entrance to National Park, 10°27.13'S, 105°39.51'E, alt. 210 m, on bark of exposed road-side tree, *McCarthy 1601*, 26.vii.2000; •Murray Rd, 3.5 km NNE of Central Area Workshop, 10°27.26'S, 105°39.34'E, alt. 210 m, on bark in moderately dense primary forest, *McCarthy 1641*, 26.vii.2000.

Dirinaria picta (Sw.) Schaer. ex Clem., *Gen. Fung.* 323 (1931)

This is a common, coastal species throughout the tropics.

SELECTED SPECIMENS EXAMINED

•Settlement, c. 500 m S of Rocky Point, 10°25.05'S, 105°40.30'E, alt. 30 m, on bark in sparse regrowth of tall trees, *Lepp 70049B*, 23.vii.2001; •c. 1 km N of Grants Well, 10°28.25'S, 105°39.10'E, 270 m, on bark in moderately dense primary forest, *Lepp 70217*, 28.vii.2000; •Settlement, Gaze Rd, near Chinese cemetery, 10°25.05'S, 105°40.55'E, alt. 50 m, on bark in moderately dense primary forest, *Lepp 70306A*, 30.vii.2000.

Endocarpon adscendens (Anzi) Müll. Arg., *Bull. Trav. Soc. Murith. Valais* 10, 58 (1881)

A minutely squamulose, pyrenocarpous lichen, *E. adscendens* is probably cosmopolitan in its distribution. In the region, it is also known from Thailand and subtropical Queensland.

SPECIMEN EXAMINED

•Margaret Knoll Lookout, 10°28.63'S, 105°41.05'E, alt. 250 m, on moderately

sheltered limestone on cliff-top, *McCarthy 1442* (part), 2.viii.2000.

Enterographa deslooveri Sérus., in Aptroot *et al.*, *Biblioth. Lichenol.* **57**, 28 (1995)

This foliicolous lichen was recently described from Papua New Guinea (Aptroot *et al.* 1995).

SPECIMEN EXAMINED

•Track to Greta Beach, 500 m SE of main road, 10°29.12'S, 105°40.52'E, alt. 200 m, on leaves in moderately dense primary forest, *McCarthy 1421* (part), 2.viii.2000.

Fellhanera bouteillei (Desm.) Vězda, *Folia Geobot. Phytotax.* **21**, 214 (1986)

This mainly foliicolous, subcosmopolitan species also grows on bark and rock in many tropical, subtropical and temperate regions.

SELECTED SPECIMENS EXAMINED

•Irvine Hill Rd, old track to Hanitch Hill, 10°26.77'S, 105°40.22'E, alt. 275 m, on leaves in dense primary forest, *McCarthy 1679C*, 24.vii.2000; •track to Margaret Knoll Lookout, 250 m SSW of Gannet Hill, 10°28.44'S, 105°40.98'E, alt. c. 250 m, on leaves in moderately dense primary forest, *McCarthy 1415* (part), 2.viii.2000.

Fellhanera subternella (Nyl.) Vězda, *Folia Geobot. Phytotax.* **21**, 215 (1986)

This pantropical lichen is also known from eastern Queensland.

SELECTED SPECIMENS EXAMINED

•Murray Rd, 2.8 km NNE of Central Area Workshop, 10°27.64'S, 105°38.81'E, alt. 200 m, on leaves in dense primary forest, *McCarthy 1392* (part), 26.vii.2000; •track to Margaret Knoll Lookout, 250 m S of Gannet Hill, 10°28.45'S, 105°41.05'E, alt. c. 250 m, on leaves in moderately dense primary forest, *McCarthy 1356*, 2.viii.2000.

Glyphis cicatricosa Ach., *Syn. Meth. Lich.* **07** (1814)

This lichen is found in most tropical regions.

SPECIMEN EXAMINED

•North-South Baseline Rd, 1.2 km S of airport, 10°27.28'S, 105°41.29'E, alt. 230 m, on bark of road-side tree, *McCarthy 1492*, 31.vii.2000.

Lasioloma arachnoideum (Kremp.) R. Sant., *Symb. Bot. Upsal.* **12**(1), 545 (1952)

This pantropical species of Ectolechiaceae was collected only once in Christmas Island. However, it was exceptionally abundant at that site, its thalli covering the host leaves and overgrowing most other foliicolous lichens.

SPECIMEN EXAMINED

•1 km WNW of Grants Well, 10°28.71'S, 105°38.60'E, alt. 240 m, on leaves of trackside Rutaceae, *McCarthy 1643*, 28.vii.2000.

Leptogium azureum (Sw. ex Ach.) Mont., in Webb & Berthelot, *Hist. Nat Îles Canaries* **3**, 129 (1840)

This lichen is found in most tropical and subtropical regions.

SPECIMENS EXAMINED

•Irvine Hill Rd, 800 m SW of Irvine Hill, 10°26.62'S, 105°40.33'E, alt. 290 m, on isolated tree in fern-dominated secondary growth, *McCarthy 1504*, 24.vii.2000; •800 m NW of Jacks Hill, 10°28.06'S, 105°35.36'E, alt. 270 m, on bark in moderately dense primary forest, *McCarthy 1681*, 27.vii.2000.

Leptogium pellobatum Verdon, *Mycotaxon* **37**, 418 (1990)

This species is moderately common on tree-trunks and large branches on the forest plateau of Christmas Island. It was previously known only from north-eastern Queensland.

SELECTED SPECIMENS EXAMINED

•Irvine Hill Rd, 800 m SW of Irvine Hill, 10°26.62'S, 105°40.33'E, alt. 290 m, on isolated tree in fern-dominated secondary growth, *McCarthy 1635*, 24.vii.2000; •Murray Rd, 3.3 km NNE of Central Area Workshop, 10°27.36'S, 105°39.24'E, alt. 220 m, on bark in moderately dense primary forest, *McCarthy 1613*, 26.vii.2000; •pipeline track from Murray Rd, 1.2 km E of Central Area Workshop, 10°28.65'S, 105°38.42'E, alt. 240 m, on bark in dense primary forest, *McCarthy 1637*, 26.vii.2000.

Leptogium phyllocarpum (Pers.) Mont., *Ann. Sci. Nat., Bot., sér.* **3**, **10**, 134 (1848)

The circumscription and typification of this pantropical lichen have recently been reassessed (Verdon 2001).

SELECTED SPECIMENS EXAMINED

•Irvine Hill Rd, 800 m SW of Irvine Hill, 10°26.62'S, 105°40.33'E, alt. 290 m, on isolated tree in fern-dominated secondary growth, *McCarthy 1622*, 24.vii.2000; •c. 750 m SW of Hanitch Hill, 10°27.20'S, 105°39.30'E, alt. 280 m, on bark in moderately dense primary forest, *Lepp 70229*, 28.vii.2000.

Leptogium poliophaeum Verdon, *Mycotaxon* **37**, 420 (1990)

This lichen was previously known only from north-eastern Queensland.

SPECIMEN EXAMINED

•1.8 km ESE of Grants Well, 10°28.98'S, 105°40.09'E, alt. 240 m, on bark in moderately dense primary forest, *McCarthy 1621*, 31.vii.2000.

Leptogium wilsonii Zahlbr., *Cat. Lich. Univ.* **3**, 160 (1924)

This lichen was previously known only from eastern Queensland.

SPECIMEN EXAMINED

•c. 1.5 km ESE of Jacks Hill, 10°29.00'S, 105°36.30'E, alt. 250 m, on bark in dense primary forest, *Lepp 70168*, 27.vii.2000.

Letrouitia parabola (Nyl.) R. Sant. & Hafellner, in Hafellner & Bellemère, *Nova Hedwigia* **35**, 281 (1982)

A pantropical lichen with a distribution that includes Java, New Guinea and eastern Queensland, *L. parabola* is very common on tree trunks and lower branches on the forest plateau of Christmas Island.

SELECTED SPECIMENS EXAMINED

•Murray Rd, 3.3 km NNE of Central Area Workshop, 10°27.36'S, 105°39.24'E, alt. 220 m, on bark in moderately dense primary forest, *McCarthy 1609*, 26.vii.2000; •pipeline track from Murray Rd, 1.2 km E of Central Area Workshop, 10°28.65'S, 105°38.42'E, alt. 240 m, on bark in dense primary forest, *McCarthy 1515*, 26.vii.2000; •1.8 km ESE of Grants Well, 10°28.98'S, 105°40.09'E, alt. 240 m, on bark in moderately dense primary forest, *McCarthy 1620*, 31.vii.2000.

Letrouitia vulpina (Tuck.) Hafellner & Bellem., *Nova Hedwigia* **35**, 281 (1982)

In contrast to the previous species, the pantropical *L. vulpina* is rare in Christmas Island.

SPECIMEN EXAMINED

•800 m NW of Jacks Hill, 10°28.06'S, 105°35.36'E, alt. 270 m, on bark in moderately dense primary forest, *McCarthy 1683*, 27.vii.2000.

Mazosia melanophthalma (Müll. Arg.) R. Sant., *Symb. Bot. Upsal.* **12**(1), 117 (1952)

This pantropical species is frequently seen, but never very abundant, on the forest plateau of Christmas Island.

SELECTED SPECIMENS EXAMINED

•Off Murray Rd, near entrance to National Park 300 m along power-line track, 10°27.22'S, 105°39.62'E, alt. 250 m, on leaves in dense primary forest, *McCarthy 1353*, 28.vii.2000; •1.6 km ESE of Grants Well, 10°28.91'S, 105°39.95'E, alt. 245 m, on leaves in scrubby secondary forest, *McCarthy 1646* (part), 31.vii.2000.

Mazosia phyllosema (Nyl.) Zahlbr., *Cat. Lich. Univ.* 2, 503 (1923)

The global and local distributions of *M. phyllosema* are very similar to those of *M. melanophthalma*.

SELECTED SPECIMENS EXAMINED

•Irvine Hill Rd, old track to Hanitch Hill, 10°26.77'S, 105°40.22'E, alt. 275 m, on leaves in dense primary forest, *McCarthy 1700*, 24.vii.2000; •1.7 km ESE of Jacks Hill, 10°29.00'S, 105°36.53'E, alt. 240 m, on leaves in dense primary forest, *McCarthy 1664*, 27.vii.2000; •2 km ESE of Jacks Hill, 10°28.94'S, 105°36.65'E, alt. 240 m, on leaves in moderately dense primary forest, *McCarthy 1544*, 27.vii.2000.

Opegrapha aff. *vegae* R. Sant., *Symb. Bot Upsal.* 12(1), 99 (1952)

The thallus is pale green, and the algae resemble *Phycopeltis*, with ellipsoid to rectangular cells forming loosely radiating plates. The lirellae are dull black, rather prominent, unbranched, with a slit-like to slightly gaping disc and 0.2–0.4 mm long and c. 0.1 mm wide. The 3-septate ascospores are fusiform, straight or curved and 10–17 × 2.5–3.5 µm.

Santesson (1952) described *O. vegae* from SE Asia, and noted considerably longer lirellae [(0.2–)0.3–1.0(–1.8) mm]. It is also known from the Neotropics, and it was recently reported from palm leaves in the Chagos Archipelago in the central Indian Ocean (Seaward & Aptroot 2000). This lichen was collected at two localities in Christmas Island; at one site it was associated only with *Enterographa deslooveri*, while at the second it grew in abundance, the only foliicolous lichen on a coastal terrace.

SPECIMENS EXAMINED

•750 m S of North-East Point, near The Grotto, 10°25.24'S, 105°42.20'E, alt. c. 10 m, on leaves in moderately dense primary forest, *McCarthy 1701*, 23.vii.2000; •track to Greta Beach, 500 m SE of main road, 10°29.12'S, 105°40.52'E, alt. 200 m, on leaves in moderately dense primary forest, *McCarthy 1421* (part), 2.viii.2000.

Parmeliella brisbanensis (C. Knight) P.M. Jørg. & D.J. Galloway, *Fl. Australia* 54, 316 (1992)

Widespread in the tropics, this lichen is locally abundant on the trunks and branches of mature trees in dense forest and more exposed sites in Christmas Island.

SELECTED SPECIMENS EXAMINED

•Irvine Hill Rd, 800 m SW of Irvine Hill, 10°26.62'S, 105°40.33'E, alt. 290 m, on isolated tree in fern-dominated secondary growth, *McCarthy 1634*, 24.vii.2000; •c. 1.5 km ESE of Jacks Hill, 10°29.00'S, 105°36.30'E, alt. 250 m, on bark in dense primary forest, *Lepp 70167*, 27.vii.2000.

Parmotrema cristiferum (Taylor) Hale, *Phytologia* 28, 335 (1974)

This lichen is rather common in most tropical and subtropical regions.

SPECIMENS EXAMINED

•Pipeline track from Murray Rd, 1.2 km E of Central Area Workshop, 10°28.65'S, 105°38.42'E, alt. 240 m, on epiphytic ferns in dense primary forest, *McCarthy 1516*, 26.vii.2000; •*loc. id.*, on fallen canopy branch in dense primary forest, *McCarthy 1536*, 26.vii.2000.

Parmotrema gardneri (C.W. Dodge) Sérus., *Bryologist* 87, 5 (1984)

Parmotrema gardneri is a common pantropical lichen.

SELECTED SPECIMENS EXAMINED

•Irvine Hill Rd, 800 m SW of Irvine Hill, 10°26.62'S, 105°40.33'E, alt. 290 m, on isolated tree in fern-dominated secondary growth, *McCarthy 1503*, 24.vii.2000; •Murray Rd, 3.3 km NNE of Central Area Workshop, 10°21.36'S, 105°39.24'E, alt. 220 m, on fallen canopy twig in moderately dense primary forest, *McCarthy 1550*, 26.vii.2000; •track to Margaret Knoll Lookout, 200 m WSW of Gannet Hill, 10°28.33'S, 105°40.96'E, alt. c. 250 m, on fallen canopy twigs in moderately dense primary forest, *McCarthy 1505B*, 2.viii.2000.

Parmotrema tinctorum (Nyl.) Hale, *Phytologia* 28, 339 (1974)

This species is known from most tropical and temperate regions.

SELECTED SPECIMENS EXAMINED

•Murray Rd, near entrance to National Park 10°27.13'S, 105°39.51'E, alt. 210 m, on exposed road-side tree, *McCarthy 1501*, 26.vii.2000; •West White Beach walking track, 10°28.25'S, 105°34.76'E, alt. 270 m, on branches at margin of moderately dense primary forest, *McCarthy 1520*, 27.vii.2000; •track to Margaret Knoll Lookout, 200 m WSW of Gannet Hill, 10°28.33'S, 105°40.96'E, alt. c. 250 m, on fallen canopy twigs in moderately dense primary forest, *McCarthy 1505C*, 2.viii.2000.

Phyllopsora breviuscula Müll. Arg. var. *javanica* (Schaer.) Zahlbr., *Cat. Lich. Univ.* 4, 396 (1927)

This lichen was previously known from Java and New Guinea. It is reported here for the first time from Australian territory.

SPECIMENS EXAMINED

•1.5 km S of Smith Point, Daniel Roux Cave, 10°26.66'S, 105°39.64'E, alt. c. 100 m, on bark in moderately dense primary forest, *McCarthy 1581*, 29.vii.2000; •800 m NW of Jacks Hill, 10°28.06'S, 105°35.36'E, alt. 270 m, on bark in moderately dense primary forest, *McCarthy 1682* (part), 27.vii.2000.

Physcia atrostriata Moberg, *Nordic J. Bot.* 6, 853 (1986)

Recently reported for the first time from Australia (Northern Territory, Queensland and New South Wales; Moberg 2001), *P. atrostriata* is also known from East Africa and South America.

SPECIMEN EXAMINED

•Murray Rd, near entrance to National Park, 10°27.13'S, 105°39.51'E, alt. 210 m, on bark of exposed road-side tree, *McCarthy 1605*, 26.vii.2000.

Physcia integrata Nyl., *Syn. Meth. Lich.* 1(2), 424 (1860)

Rather common in Christmas Island, this mainly corticolous species is known from only one locality in mainland Australia (coastal New South Wales); it also occurs in East Africa, Mexico and South America.

SELECTED SPECIMENS EXAMINED

•Old track from Lily Beach to Ethel Beach, 10°27.55'S, 105°42.35'E, alt. 20 m, on bark in moderately dense primary forest, *Lepp 70114*, 25.vii.2000; •Lily Beach, 10°28.02'S, 105°42.40'E, alt. 2 m, on bark in mixed coastal vegetation with a moderately dense canopy, *Lepp 70113*, 25.vii.2000; •near Daniel Roux Cave, 10°26.35'S, 105°39.40'E, alt. 70 m, on bark in moderately dense primary forest, *Lepp 70259*, 29.vii.2000.

Physcia undulata Moberg, *Nordic J. Bot.* 6, 861 (1986)

Physcia undulata was recently reported for the first time from Australia (Moberg 2001); it also grows on trees and rocks in East Africa and Central and South America.

SPECIMENS EXAMINED

•Near Daniel Roux Cave, 10°26.35'S, 105°39.40'E, alt. 70 m, on bark in moderately dense primary forest, *Lepp 70260*, 29.vii.2000; •c. 1 km WSW of North-East Point, 10°24.55'S, 105°41.50'E, alt. 20 m, on bark in mixed forest, *Lepp 70029*, 23.vii.2000; •c. 750 m S of North-East Point, 10°25.15'S, 105°42.10'E, alt. 20 m, on bark in mixed tropical forest, *Lepp 70034*, 23.vii.2000.

Physma byrsaeum (Ach.) Tuck., *Syn. N. Amer. Lich.* 1, 115 (1992)

The distribution of this pantropical lichen includes SE Asia, Malesia and north-eastern Australia.

SPECIMEN EXAMINED

•Murray Rd, near entrance to National Park, 10°27.13'S, 105°39.51'E, alt. 210 m, on bark of exposed road-side tree, *McCarthy 1606*, 26.vii.2000.

Pocisia mucronata P.M. McCarthy, *Lichenologist* 31, 141 (1999)

This minute and very inconspicuous species was previously known only from Lord Howe I., in the southwestern Pacific Ocean, where it inhabits the leaves of an endemic palm.

SPECIMEN EXAMINED

•The Dales, directly above Hugh's Dale Waterfall, 10°28.78'S, 105°33.59'E, alt. 100 m, on leaves of a broad-leaved tree in sparse, primary forest, *McCarthy 1652*, 1.viii.2000.

Pyrenula concaterfans (Nyl.) R.C. Harris, in Tucker & Harris, *Bryologist* 83, 15 (1980)

This lowland, pantropical lichen was collected only once near the east coast of Christmas Island. It is reported here for the first time from Australian territory.

SPECIMEN EXAMINED

•Track to Greta Beach, 500 m S of Ross Hill Gardens pump-house, 10°29.48'S, 105°40.64'E, alt. 80 m, on tree-trunk in moderately dense primary forest, *McCarthy 1447*, 2.viii.2000.

Pyrenula confinis (Nyl.) R.C. Harris, *More Florida Lich.*: 109 (1995)

This pantropical lichen was collected at one locality in Christmas Island.

SPECIMEN EXAMINED

•Track to Greta Beach, 500 m SE of road, 10°29.12'S, 105°40.52'E, alt. 200 m, on tree-trunk in moderately dense primary forest, *McCarthy 1487*, 2.viii.2000.

Pyrenula parvinuclea (Meyen & Flotow) Aptroot, in Aptroot *et al.*, *Biblioth. Lichenol.* 64, 165 (1997)

A coastal Palaeotropical species that is moderately common in Christmas Island, *P. parvinuclea* is possibly conspecific with *P. confinis*. While the former has a UV-thallus, in *P. confinis* the thallus is UV+ yellow.

SELECTED SPECIMENS EXAMINED

•Track to Greta Beach, 150 m S of Ross Hill Gardens pump-house, 10°29.29'S, 105°40.66'E, alt. 80 m, on bark in moderately dense primary forest, *McCarthy 1448*, 2.viii.2000; •Murray Rd, 3.3 km NNE of Central Area Workshop, 10°27.36'S, 105°39.24'E, alt. 220 m, on canopy branch in moderately dense primary forest, *McCarthy 1460*, 26.vii.2000; •near Golf Course, 10°25.83'S, 105°42.14'E, alt. 25 m, on isolated road-side tree-trunk, *McCarthy 1476*, 25.vii.2000.

Pyrenula macularis (Zahlbr.) R.C. Harris, *Mem. New York Bot. Gard.* 49, 94 (1989)

This common and often abundant pantropical species occurs on the trunks, branches and canopy twigs of a wide variety of host trees in Christmas Island.

SELECTED SPECIMENS EXAMINED

•2 km ESE of Jacks Hill, 10°28.94'S, 105°36.65'E, alt. 240 m, on twig in moderately dense primary forest, *McCarthy 1474*, 27.vii.2000; •near Golf Course, 10°25.83'S, 105°42.14'E, alt. 25 m, on isolated road-side tree-trunk, *McCarthy 1475*, 25.vii.2000; •track to Greta Beach, 500 m SE of road, 10°29.12'S, 105°40.52'E, alt. 200 m, on tree-trunk in moderately dense primary forest, *McCarthy 1488*, 2.viii.2000.

Pyrenula ochraceoflava (Nyl.) R.C. Harris var. *ochraceoflava*, *Mem. New York Bot. Gard.* 49, 96 (1989)

A lowland pantropical species, *P. ochraceoflava* var. *ochraceoflava* was seen only on trunks of *Cocos nucifera*, near the seashore.

SPECIMENS EXAMINED

•Golf Course, 10°25.73'S, 105°42.10'E, alt. 25 m, *McCarthy 1466*; •1.5 km E of Rocky Point, near Islamic cemetery, 10°24.99'S, 105°41.23'E, alt. c. 10 m, on trunks of *Cocos nucifera*, *McCarthy 1467*, 25.vii.2000.

Pyxine cocoas (Sw.) Nyl., *Mém. Soc. Sci. Nat. Cherbourg* 5, 108 (1857)

This is a common, coastal, pantropical lichen.

SPECIMENS EXAMINED

•Settlement, c. 500 m S of Rocky Point, 10°25.05'S, 105°40.30'E, alt. 30 m, on bark in sparse regrowth of tall trees, *Lepp 70049A*, 23.vii.2001; •Settlement, Gaze Rd, near Chinese cemetery, 10°25.05'S, 105°40.55'E, alt. 50 m, on bark in moderately dense primary forest, *Lepp 70306B*, 30.vii.2000.

Pyxine consocians Vain., *Philipp. J. Sci.*, sect. C, 8, 109 (1913)

In Christmas Island this species is more common than *P. cocoas*, and, rather than occurring on the coastal terraces, it is apparently confined to the more elevated forest plateau. *Pyxine consocians* has a broadly Palaeotropical and Pacific distribution.

SELECTED SPECIMENS EXAMINED

•Murray Rd, c. 1 km E of Hanitch Hill, 10°27.15'S, 105°39.20'E, alt. 210 m, on bark in moderately dense primary forest, *Lepp, 70133*, 26.vii.2000; •c. 1 km N of Grants Well, 10°28.25'S, 105°39.10'E, 270 m, on bark in moderately dense primary forest, *Lepp 70217*, 28.vii.2000; •c. 500 m E of Grants Well, 10°28.50'S, 105°39.30'E, alt. 230 m, on bark in moderately dense primary forest, *Lepp 70341*, 31.vii.2000.

Ramalina dumeticola Krog & Swinscow, *Norweg. J. Bot.* 23, 163 (1976)

All three species of *Ramalina* are found in the forest canopy or on road-side trees and sign-posts. *Ramalina dumeticola* has a broadly Palaeotropical distribution. It was observed being eaten by a red land crab in Christmas Island (*McCarthy 2001a*).

SPECIMEN EXAMINED

•c. 1.5 km SSW of airport, 10°27.50'S, 105°41.10'E, alt. 240 m, moderately dense primary forest, *Lepp 70327C*, 31.vii.2000.

Ramalina pacifica Asah., *J. Jap. Bot.* 15, 213 (1939)

This lichen has an eastern Palaeotropical distribution.

SPECIMEN EXAMINED

•c. 1.5 km SSW of airport, 10°27.50'S, 105°41.10'E, alt. 240 m, moderately dense primary forest, *Lepp 70327B*, 31.vii.2000.

Ramalina zollingeri Szat., *Repert. Spec. Nov. Regni Veg.* 42, 226 (1937)

This lichen is common on road-side trees and in the forest canopy. It was previously known only from Java.

SELECTED SPECIMENS EXAMINED

•Near Christian cemetery at eastern end of Settlement, 10°25.05'S, 105°41.00'E, alt. 30 m, road-side thicket of tall trees, *Lepp 70007*, 23.vii.2000; •c. 500 m NNE of Ryan Hill, 10°27.50'S, 105°42.30'E, alt. 80 m, road-side margin of moderately dense primary forest, *Lepp 70117*, 25.vii.2000; •c. 1.5 km SSW of airport, 10°27.50'S, 105°41.10'E, alt. 240 m, moderately dense primary forest, *Lepp 70327A*, 31.vii.2000.

Sporopodium flavescens (R. Sant.) Vězda, *Sched. Lich. Sel. Exs., Fasc. 88*, 5, no. 2193 (1988)

This species, known from Malesia, eastern Australia and the south-western Pacific, is readily recognised by the bright yellow apices of the conidiomata.

SPECIMEN EXAMINED

•Irvine Hill Rd, old track to Hanitch Hill, 10°26.77'S, 105°40.22'E, alt. 275 m, on leaves in dense primary forest, *McCarthy 1726*, 24.vii.2000.

Sporopodium phyllocharis (Mont.) A. Massal., *Alcuni Generi di Licheni* 9 (1855)

This pantropical lichen also occurs in eastern Queensland.

SELECTED SPECIMENS EXAMINED

•Near North-South Baseline Rd, c. 2 km SSW of airport, disused forest track, 10°28.23'S, 105°40.83'E, alt. 240–250 m, on leaves in moderately dense primary forest, *McCarthy 1410* (part), 31.vii.2001; •track to Margaret Knoll Lookout, 250 m S of Gannet Hill, 10°28.45'S, 105°41.05'E, alt. c. 250 m, on leaves in moderately dense primary forest, *McCarthy 1358* (part), 2.viii.2000.

Sporopodium xantholeucum (Müll. Arg.) Zahlbr., *Cat. Lich. Univ.* 2, 681 (1924)

This pantropical lichen also occurs in eastern Queensland.

SELECTED SPECIMENS EXAMINED

•1.7 km ESE of Jacks Hill, 10°29.00'S, 105°36.53'E, alt. 240 m, on leaves in dense primary forest, *McCarthy 1388*, 27.vii.2000; •1.5 km SW of Central Area Workshop, 10°28.89'S, 105°37.11'E, alt. 240 m, on leaves in moderately dense primary forest, *McCarthy 1407* (part), 27.vii.2000.

Staurothele pallidopora P.M. McCarthy, *Muelleria* 8, 275 (1995)

This is one of the most common and noticeable calcicolous lichens on coastal terraces in the north-east of the island; however, it was not seen on the forest plateau (i.e. above 200 m). *Staurothele pallidopora* is also known from limestone and siliceous rocks in eastern Queensland (McCarthy 2001e). Its relationship with the montane and aquatic *S. malayensis* Zahlbr. (syn. *S. australis* Groenh. ?) from Indonesia and New Guinea requires investigation.

SELECTED SPECIMENS EXAMINED

•Near Daniel Roux Cave, 10°26.35'S, 105°39.40'E, alt. 70 m, on limestone in moderately dense primary forest, *Lepp 70232*, 29.vii.2000; •Settlement, Gaze Rd, near Chinese cemetery, 10°25.04'S, 105°40.99'E, alt. 20–60 m, on limestone in moderately dense primary forest, *McCarthy 1355*, 30.vii.2000.

Thelenella brasiliensis (Müll. Arg.) Vain., *J. Bot.* 34, 293 (1896)

This tropical to warm-temperate species has a distribution that includes Papua New Guinea and Queensland. The ascospores of the Christmas Island specimen (24–38 × 9–15 µm) are somewhat larger than those of other collections (H. Mayrhofer, pers. comm.).

SPECIMEN EXAMINED

•The Dales, below Hugh's Dale Waterfall, 10°28.78'S, 105°33.59'E, alt. c. 90 m, on small basalt boulder in moderately dense primary forest, *McCarthy 1361*, 1.viii.2000.

Tricharia albostrigosa R. Sant., *Symb. Bot. Upsal.* 12(1), 388 (1952)

The type locality of this pantropical foliicolous lichen is in nearby Java. The abundantly fertile thalli of the Christmas Island collections have erect, white or pale yellowish, tapering hairs; an additional, sterile species with black hairs could not be identified with certainty.

SELECTED SPECIMENS EXAMINED

•1.6 km ESE of Grants Well, 10°28.91'S, 105°39.95'E, alt. 245 m, on leaves in scrubby secondary forest, *McCarthy 1646* (part), 31.vii.2000; •pipeline track from Murray Rd, 1.2 km ENE of Central Area Workshop, 10°28.38'S, 105°38.32'E, alt. 240 m, on leaves in dense primary forest, *McCarthy 1676*, 28.vii.2000; •track to Margaret Knoll Lookout, 250 m S of Gannet Hill, 10°28.45'S, 105°41.05'E, alt. c. 250 m, on leaves in moderately dense primary forest, *McCarthy 1680*, 2.viii.2000.

Verrucaria aff. fuscella (Turner) Ach., *Lichenogr. Universalis*: 289 (1810)

A few small thalli were collected from limestone at a very exposed cliff-top on the east coast of Christmas Island. These are virtually identical in all respects with a specimen reported by McCarthy (2000) on basalt in Rarotonga, South Pacific Ocean.

SPECIMEN EXAMINED

•Margaret Knoll Lookout, 10°28.63'S, 105°41.05'E, alt. 250 m, on moderately sheltered limestone on cliff-top, *McCarthy 1442* (part), 2.viii.2000.

Verrucaria aff. mundula P.M. McCarthy, *Lichenologist* 27, 113 (1995)

Verrucaria mundula is known from damp or aquatic siliceous rocks in eastern Australia and the South Pacific. Therefore, the occurrence of a specimen, albeit morphologically very similar, on deeply shaded and essentially supralittoral limestone in Christmas Island is somewhat anomalous.

SPECIMEN EXAMINED

•1 km S of North-East Point, The Grotto, 10°25.38'S, 105°42.10'E, alt. c. 20 m, on deeply shaded limestone in moderately dense primary forest, *McCarthy 1567*, 23.vii.2000.

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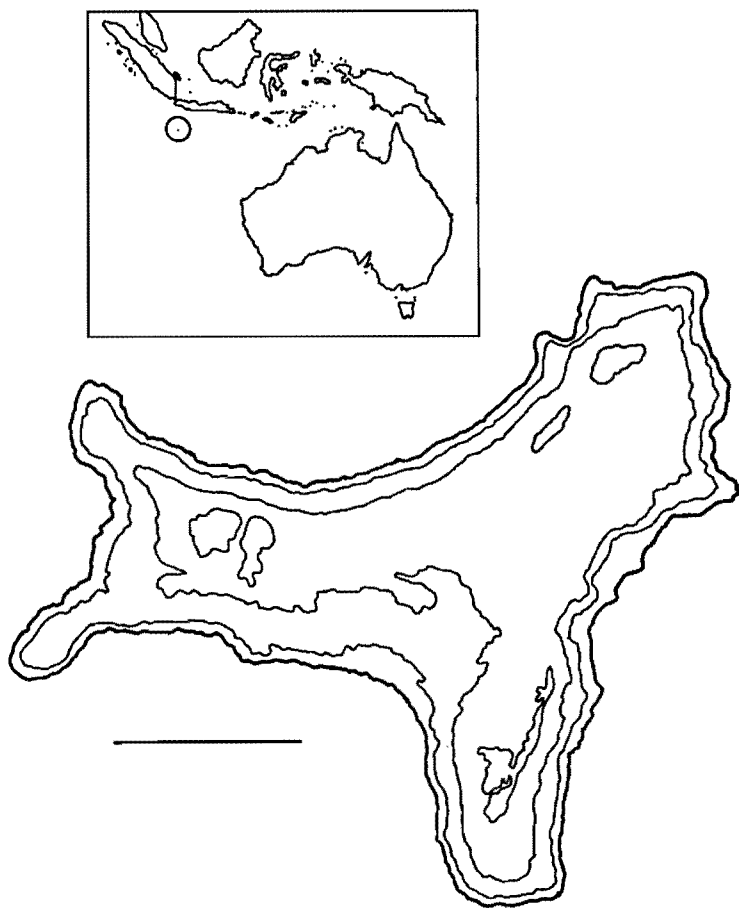


Fig. 1. Christmas Island. Scale: 5 km; contour interval: 100 m.

Additional lichen records from Australia 49. Further Parmeliaceae

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Abstract. *Parmelinopsis cryptochlora* and *Parmotrema maclayanum* are reported as new to Australia. In addition, new state or territory records are listed for 13 other species.

1. *Neofuscelia delisei* (Duby) Essl., *Mycotaxon* 7, 50 (1978).

This species was known previously from Europe, Asia, and northern Africa, and in Australia from New South Wales and the Australian Capital Territory (Elix 1994). It is characterized by the loosely adnate to adnate thallus, the black lower surface, absence of isidia, and presence of glomelliferic, glomellic, loxodellic and perlatolic acids in the medulla. A detailed description is given in Elix (1994).

SPECIMEN EXAMINED

South Australia: •Marne River, 8 km NE of Springton, 34°40'S, 139°40'E, 350 m, on sandstone rocks in grassland, *J.A. Elix 41985*, 24.ix.1994 (CANB).

2. *Neofuscelia franklinensis* Elix, *Mycotaxon* 71, 439 (1999).

This alpine species is known from the Australian Capital Territory, but has not been recorded previously from Victoria (Elix 1999). It is characterized by the tightly adnate, small foliose to subcrustose thalli with closely contiguous, centrally subareolate lobes, sparse, coralloid-branched, lobulate isidia, a pale lower surface with loboid holdfast rather than rhizines, and gyrophoric acid in the medulla. A detailed description is given in Elix (1999).

SPECIMEN EXAMINED

Victoria: •Mt Nelse, Alpine National Park, 19 km SE of Mt Beauty, 36°51'S, 147°20'E, 1880 m, on exposed granite rocks in alpine grassland, *J.A. Elix 40652 & H. Streimann*, 12.ii.1994 (CANB).

3. *Neofuscelia loxodella* (Essl.) Essl., *Mycotaxon* 7, 51 (1978).

This Australasian species is known from Western Australia, South Australia, New South Wales, the Australian Capital Territory, Victoria, Tasmania and New Zealand, but has not been recorded previously from Queensland (Elix 1994). It is characterized by a loosely to moderately adnate thallus, a black lower surface which becomes dark brown at the lobe apices, cylindrical isidia, and glomelliferic, glomellic and loxodellic acids in the medulla. A detailed description is given in Elix (1994).

SPECIMENS EXAMINED

Queensland: •Bell Creek, Iverness Road, 27 km ENE of Biloela, 24°09'S, 150°33'E, 180 m, on volcanic rocks in pasture, *J.A. Elix 34890*, 28.viii.1993 (CANB); •Isla Gorge National Park, 27 km NNE of Taroom, 25°10'S, 149°59'E, 220 m, on sandstone rocks in dry, monsoon scrub, *J.A. Elix 35173*, 31.viii.1993 (CANB).

4. *Neofuscelia luteonotata* (J. Steiner) Essl., *Mycotaxon* 7, 51 (1978).

This species is known from southern Europe, northern and southern Africa, and New Zealand, and in Australia from Western Australia, South Australia and Victoria (Elix 1994), but has not been recorded previously from the Australian Capital Territory. It is characterized by the loosely to moderately adnate thallus, pale tan to pale brown lower surface, the lack of isidia, and divaricatic or stenosporic acid in the medulla. A detailed description is given in Elix (1994).

SPECIMEN EXAMINED

Australian Capital Territory: •Canberra Nature Park, Bruce Ridge, 35°15'S, 149°05'E, 640 m, on sandstone rocks in dry *Eucalyptus* woodland, *J.A. Elix 33378*, 27.x.1992 (CANB).

5. *Neofuscelia neoglabrans* Elix, *Mycotaxon* 71, 445 (1999).

This Australian endemic was previously known only from South Australia (Elix 1999). It is characterized by the tightly adnate to adnate thallus, the pale lower surface, the absence of isidia, and by the presence of alectoronic acid in the medulla. A detailed description is given in Elix (1999).

SPECIMENS EXAMINED

New South Wales: •Mootwingee National Park, 31°17'S, 142°17'E, on sandstone rocks, *K. Ralston* 1500, 1503, 25.v.1999 (MEL).

6. *Neofuscelia parviloba* (Essl.) Essl., *Mycotaxon* 7, 51 (1978).

This endemic Australian species has been collected previously in Western Australia, Queensland, New South Wales, the Australian Capital Territory, Victoria and Tasmania (Elix 1994, 2001). It is characterized by the diminutive, subcrustose thallus, the pale lower surface, absence of isidia and presence of fumarprotocetraric and protocetraric acids in the medulla. A detailed description is given in Elix (1994).

SPECIMENS EXAMINED

South Australia: •Mt Lofty Ranges, above Saunders Creek, 6 km E of Springton, 34°42'S, 139°09'E, 350 m, on schist rocks in pasture, *J.A. Elix* 41935, 41979, 41980, 24.ix.1994 (CANB).

7. *Neofuscelia subincerta* (Essl.) Essl., *Mycotaxon* 7, 53 (1978).

This species was previously known from southern Africa, South Australia, New South Wales and the Australian Capital Territory (Elix 1994). It is characterized by the loosely adnate to adnate thallus, the cylindrical isidia, the black lower surface and the presence of glomelliferonic, loxodellonic and glomellonic acids in the medulla. A detailed description is given in Elix (1994).

SPECIMENS EXAMINED

Western Australia: •Ravensthorpe Range, South Coast Highway, 9 km E of Ravensthorpe, 33°35'S, 120°08'E, 160 m, on laterite rocks in dry sclerophyll forest *J.A. Elix* 41606, 18.ix.1994 (CANB).

8. *Neofuscelia verisidiosa* (Essl.) Essl., *Mycotaxon* 7, 53 (1978).

This species was previously known from southern Africa and New Zealand, and in Australia from Western Australia, South Australia, New South Wales, the Australian Capital Territory and Tasmania (Elix 1994). It is characterized by the adnate thallus, the cylindrical isidia, the black lower surface and the presence of alectoronic and α -collatolic acids in the medulla. A detailed description is given in Elix (1994).

SPECIMENS EXAMINED

Victoria: •Track to Mt Cope, Alpine National Park, 23 km SSE of Mt Beauty, 36°56'S, 147°17'E, 1750 m, on granite rocks in *Eucalyptus pauciflora* woodland, *J.A. Elix* 40698 & *H. Streimann*, 19.ii.1994 (CANB).

9. *Parmelia protosignifera* Elix & J. Johnst., *Mycotaxon* 31, 493 (1988).

This Australasian species is known from New South Wales, Victoria and New Zealand, but has not been recorded previously from the Australian Capital Territory (Elix 1994). It is characterized by the lack of soredia and isidia, the occurrence of prominent, effigurate maculae which form a reticulate pattern, the bifusiform conidia, and the presence of protocetraric acid in the medulla. A detailed description is given in Elix (1994).

SPECIMENS EXAMINED

Australian Capital Territory: •Mt Aggie, 43 km WSW of Canberra, 35°28'S, 148°48'E, 1480 m, on exposed schistose outcrop, *V. Wirth* 11047, *H. Streimann* & *D. Verdon*, 19.x.1981 (STU).

10. *Parmelinopsis cryptochlora* (Vain.) Elix & Hale, *Mycotaxon* 29: 242 (1987).

This species is known from the Caribbean, India (Hale 1976) and Papua New Guinea (Streimann 1986). It is characterized by the diminutive thallus with narrow, ascending, \pm revolute lobes, the subapical, capitate soralia, and by the chemistry of the medulla. *Parmelinopsis cryptochlora* closely resembles *P. afrorevoluta* (Krog & Swinscow) Elix & Hale, but is distinguished by the smaller thallus (1–3 cm cf. 4–10 cm wide), narrower lobes (0.5–2 mm cf. 2–5 mm wide), the capitate soralia (in *P. afrorevoluta* the soralia are pustulate) and minor differences in medullary chemistry. Thus *P. afrorevoluta* contains significant amounts of 5-O-methylhiascic and 4,5-di-O-methylhiascic acids, whereas *P. cryptochlora* contains methyl hiascate and umbilicic acid. A detailed description follows.

Thallus adnate, 1–3 cm wide. Lobes separate at first, then crowded, subimbricate to imbricate, sublinear, subdichotomously to subirregularly branched, 0.5–2.0 mm wide, sinuous in axils; margins entire, blackened, ciliate; cilia common, moderately dense, simple or rarely forked, c. 0.1–0.5 mm long; apices subtruncate, \pm ascending. Upper surface pale grey to grey, smooth, shiny, emaculate, sorediate; soralia apical or subapical, capitate, the sorediate lobes becoming revolute; soredia farinose. Medulla white. Lower surface shiny, black, \pm brown at apices, smooth, moderately rhizinate; rhizines simple or bifurcate. Apothecia and pycnidia not seen.

Chemistry: cortex K+ yellow; medulla K-, C+ rose, KC+ red, P-; containing atranorin (minor), chloroatranorin (minor), gyrophoric acid (major), methyl hiascate (minor), 4-O-methylhiascic acid (minor), umbilicic acid (minor), lecanoric acid (minor), hiascic acid (minor/trace).

SPECIMENS EXAMINED

Queensland: •Lannercost State Forest, Old Mill Road, 40 km WSW of Ingham, 18°46'S, 145°48'E, 640 m, on tree in *Eucalyptus-Casuarina* dominated forest, *J.A. Elix* 15480 & *H. Streimann*, 19.vi.1984 (CANB).

11. *Parmotrema maclayanum* (Müll. Arg.) Hale, *Phytologia* 28, 337 (1974).

This species is known from Africa, Madagascar, Thailand, Brazil and New Caledonia (Krog & Swinscow 1981) and Papua New Guinea (Louwhoff & Elix 1999). It is characterized by the moderately to loosely adnate thallus, the suberect, sparsely ciliate lobe margins, the emaculate upper surface, the lack of isidia and soredia, and by the presence of alectoronic acid and traces of related unknown substances in the medulla. *Parmotrema maclayanum* is most similar to *P. subrugatum* (Kremp.) Hale, but can be distinguished by the lack of a medullary pigment, the lack of dense lobulae, and by the sparse rather than moderately dense cilia. A detailed description follows.

Thallus moderately to loosely adnate, coriaceous, 6–10 cm wide. Lobes weakly imbricate at margins or not so, irregular, rounded, (0.5–)1–1.5(–2.5) cm wide; margins entire or crenate-dentate, suberect to erect, rarely \pm sublobulate, ciliate; cilia sparse, 0.5–2 mm long. Upper surface pale grey, emaculate, irregularly cracked towards the centre, lacking isidia and soredia. Medulla white. Lower surface smooth or rugose, black, with a dark brown, erhizinate marginal zone, 0.5–1 cm wide; rhizines black, up to 1 mm long, sparse, in scattered groups. Apothecia submarginal, pedicellate, to 2 cm wide; disc dark brown, imperforate or with a small perforation; thalline exciple \pm rugose, maculate; margin thin, smooth or weakly crenate. Ascospores 12–17 \times 7–10 μ m. Pycnidia submarginal, common. Conidia sublageniform, 5–7.5 \times 1 μ m.

Chemistry: cortex K+ yellow; medulla K-, KC+ purple, P+ red; containing atranorin, chloroatranorin, alectoronic acid (major), conalectoronic acid (trace), \pm secalonic acid A (trace).

SPECIMENS EXAMINED

Queensland: •Clarke Range, 46 km S of Proserpine, 20°50'S, 148°32'E, 800 m, on granite rocks on edge of escarpment in *Eucalyptus-Casuarina* dominated woodland, *J.A. Elix* 20927 & *H. Streimann*, 29.vi.1986 (CANB).

12. *Xanthoparmelia bicolorans* Elix & Kantvilas, *Mycotaxon* 73, 442 (1999).

This Australian endemic species is known from Victoria and Tasmania (Elix & Kantvilas 1999), but has not previously been reported for New South Wales. It is characterized by the narrow lobes with a black or brown-black lower surface at or near the periphery of the thallus, but a brown to pale brown lower surface within and at the centre of the thallus, the lack of soredia and isidia, the development of narrower, sublanceolate-elongate laciniae and the production of norstictic and connorstictic acids in the medulla. A detailed description is given in Elix & Kantvilas (1999).

SPECIMEN EXAMINED

New South Wales: •Currowan State Forest, 15 km NW of Batemans Bay, 35°38'S, 150°05'E, on granite boulder in *Eucalyptus-Macrozamia* dominated forest, *J.A. Elix* 30337, 14.x.1999 (CANB).

13. *Xanthoparmelia condaminensis* Elix & J. Johnst., *Mycotaxon* 29, 363 (1987).

Previously, this Australian endemic species was only known from the type locality in Queensland (Elix 1994), but is now reported for New South Wales. It is characterized by the elongated, weakly convoluted lobes with a pale tan to light brown lower surface, the lack of soredia and isidia, the development of sparse lobules along the margins and the production of constipatic and protoconstipatic acids in the medulla. A detailed description is given in Elix (1994).

SPECIMEN EXAMINED

New South Wales: •Ruby Creek, Stanthorpe-Amosfield road, 45 km N of Tenterfield, 28°38'S, 152°01'E, on low, flat granite boulders in sparse, heathy area, *J.A. Elix* 35676, 5.ix.1993 (CANB).

14. *Xanthoparmelia microcephala* Elix & Kantvilas, *Mycotaxon* 73, 442 (1999).

This common Australian endemic species is known from Queensland, New South Wales, the Australian Capital Territory, Western Australia and Tasmania (Elix & Kantvilas 1999), but has not previously been reported for Lord Howe Island. It is characterized by the loosely adnate to adnate thallus, narrow lobes, slender, cylindrical isidia, a pale brown lower surface, medullary salazinic acid and relatively large ascospores. A detailed description is given in Elix & Kantvilas (1999).

SPECIMEN EXAMINED

New South Wales: •Lord Howe Island, along ridge to Malabar Hill, 31°31'S, 159°04'E, 80 m, on basalt rocks in dense, shrubby vegetation, *J.A. Elix* 32918, 23.vi.1992 (CANB).

15. *Xanthoparmelia phillipsiana* Elix & J. Johnst., *Bull. Brit. Mus. (Nat. Hist.) Bot.* 15, 307 (1986).

This species was known previously from Tasmania, Macquarie Island and New Zealand. It is characterized by the adnate to tightly adnate small-foliose thallus, the narrow, convex, contiguous lobes, the dense, coralloid isidia, the black lower surface and production of the stictic acid chemosyndrome in the medulla. The larger thallus, shorter, more convex, contiguous lobes and tall, dense, coralloid isidia distinguish this species from the more common, chemically identical *Xanthoparmelia mougeotina* (Nyl.) D.J. Galloway. A detailed description is given in Elix (1994).

SPECIMENS EXAMINED

Victoria: •Mt Eccles National Park, c. 8 km SW of Macarthur, 38°04'S, 141°56'E, on basalt rocks in dry sclerophyll forest, *J.A. Elix* 25974, 15.xii.1990 (CANB); •Stoney Rises, Pomborneit East Road, 17 km ESE of Camperdown, 38°18'S, 143°20'E, 150 m, on basalt rocks in dry sclerophyll forest, *J.A. Elix* 26028, 16.xii.1990 (CANB).

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