

Notes on the lichen flora of New South Wales I. New records

Gintaras Kantvilas

Abstract

Kantvilas, Gintaras (Tasmanian Herbarium, GPO Box 252C, Hobart, Australia, 7001) 1990. Notes on the lichen flora of New South Wales I. New records. *Telopea* 4(1): 19–31. Thirty lichen taxa previously unrecorded for New South Wales are reported. Data on their diagnostic features, taxonomy, distribution and ecology are provided.

Introduction

The number of taxa comprising the lichen flora of New South Wales is presently 819 (Filson 1988). However, this inventory is far from complete and has been compiled primarily from published accounts [see Weber & Wetmore (1972) and Kantvilas (1989) for bibliographies] and some herbarium records. Much of the State remains lichenologically unexplored and no systematic, regional or ecological study of this flora has yet been undertaken. In view of the very wide range of habitats and vegetation types represented, including sclerophyll forests, cool temperate to subtropical rainforests, heathlands, deserts, mangroves and Australia's highest mountains, it is likely that many additional species will be discovered as further field studies are undertaken.

The present paper deals with 30 lichens previously unrecorded for New South Wales in the literature. The species were collected mainly in the north of the State in cool temperate rainforest dominated by *Nothofagus moorei*. Supplementary records were obtained from the large and historically significant lichen collection in the National Herbarium of New South Wales in Sydney.

Methods

Identification of specimens is based on comparisons with type or reliably identified reference material. Chemical analyses follow the standard procedures of White & James (1985). The depth of treatment of each taxon in the text has been determined by the extent to which reliable, current descriptions are readily available in other published sources, e.g. Galloway (1985) for New Zealand.

Species

1. *Arthothelium ampliatum* (Knight & Mitten) Müll. Arg., Bull. Herb. Boissier 2, App. 1: 85 (1894).

Arthonia ampliata Knight & Mitten, Trans. Linn. Soc. Lond. 23: 106 (1860).

LECTOTYPE (fide Galloway 1985): New Zealand, ? Auckland, Charles Knight 276, 1858 (BM!).

Thallus crustose, thin, smooth to cracked, greenish grey, with a thin, black marginal prothallus. Apothecia black to black-brown, adnate, roundish or \pm elongate, to c. 1 mm diam. Epithecium brown, K+ olive-grey. Hymenium pale olive-green, K- or \pm pale olive-yellow, I+ reddish brown. Spores 8 per ascus, clavate to oblong-ellipsoid, occasionally somewhat curved, 30–37 \times 10–14 μm , terminal cell undivided, markedly enlarged, 10–14 μm diam., 'tail' muriform.

A. ampliatum is apparently rare in New South Wales where it is recorded from the twigs of *Nothofagus moorei*. It is also known from New Zealand, Tasmania and Victoria, and is easily distinguished from other New South Wales species of *Arthothelium* by its spores (see Figure 1d) which resemble those of *A. dictyosporum* (Coppins & James) Coppins (see Coppins & James 1979). Although Galloway (1985) considered *A. infusata* (Krempelh.) Müll. Arg. to be a synonym of *A. ampliatum*, that species (type specimen in M examined) has different spores and is identical with *A. interveniens* (see below). The type specimen of *A. ampliatum* consists of five pieces of bark mounted on a sheet with drawings of habit and anatomy. The uppermost central portion has a K+ magenta epithecium and is another species of *Arthothelium*, possibly *A. spadiceum* (Knight) Müll. Arg.

SPECIMEN EXAMINED: Northern Tablelands: Gloucester Tops, 1150 m, *Kantvilas* 418/88, 2.7. 1988 (HO, NSW).

2. *Arthothelium ilicinum* (Taylor) P. James, Lichenologist 3: 97 (1965).

Arthonia ilicina Taylor, Flora Hibernica 2: 105 (1836).

Arthothelium ilicinum is characterised by adnate, rounded to irregularly angulose, blackish apothecia to 0.5 mm diam., macrocephalic spores, 26–32 \times 9–13 μm , with (4–)6–7(–8) transverse septa, no longitudinal septa and walls to c. 1.5 μm thick (Figure 1e). This corticolous species has a bitemperate global distribution and appears to be rare in New South Wales.

SPECIMENS EXAMINED: Central Coast: Hornsby, F.R.M. Wilson, 9.1897 (NSW). Northern Tablelands: Thunderbolts Lookout, Barrington Tops National Park, 1350 m, *Kantvilas* s.n., 4.7.1988 (HO).

3. *Arthothelium interveniens* (Nyl.) Zahlbr., Catal. Lich. Univ. 2: 127 (1924).

Arthonia interveniens Nyl., Acta Soc. Scient. Fennic. 12: 482 (1863).

Type: America septentrionalis 235b (H-NYL 5470!).

In external appearance, *Arthothelium interveniens* resembles *A. ilicinum* but is characterised by a K+ olive hymenium and by elongate-clavate spores, 22–35(–40) \times 7–12(–14) μm , with (4–)6–7(–9) transverse septa and 0–1(–4) longitudinal septa, mainly across the central cells (Figure 1a). In New South Wales, the species is recorded in cool temperate rainforest from the shaded, smooth-barked trunks of *Doryphora sassafras*, *Lomatia* sp. and young *Nothofagus moorei*. It is also known from Tasmania, Victoria, New Zealand and North America.

A superficially similar, as yet unidentified species of *Arthothelium* has been recorded also. Like *A. interveniens*, this undetermined taxon has a K+ olive hymenium, but differs in having more elongate spores with somewhat more pointed apices and very few (0–1) longitudinal septa (Figure 1b). It occurs in similar rainforest habitats on *Doryphora*, *Nothofagus*, *Orites* and *Elaeocarpus* and may be sympatric with *Arthothelium interveniens*.

SPECIMENS EXAMINED: North Coast: Antarctic Beech Walk, Wiangerie Forest Drive, Tweed Range, 1000 m, *Kantvilas* 648/88, 3.8.1988 (HO, NSW). Central Coast: Hornsby Junction, Wilson, 9.1897 (NSW). Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 284/88, 342/88, 30.6.1988 (HO, NSW).



Figure 1. Spores of *Arthothelium* species from New South Wales: **a.** *A. interveniens* [Kantvilas 284/88 (HO)]. **b.** *A. cf. interveniens* [Kantvilas 164/88 (HO)]. **c.** *A. velatius* [isolectotype (NSW)]. **d.** *A. ampliatus* [left: Kantvilas 418/88 (HO), right: lectotype (BM)]. **e.** *A. ilicinum* [Kantvilas, Barrington Tops s.n. (HO)].

Undetermined taxon (cf. *A. interveniens*):

Northern Tablelands: Mt Allyn Forest Park, start of track to Burruga Swamp, 980 m, *Kantvilas* 164/88, 28.6.1988 (NSW, HO); Burruga Swamp, 1000 m, *Kantvilas* 227/88, 29.6.1988 (NSW, HO); Gloucester Tops, 1150 m, *Kantvilas* 417/88, 2.7.1988 (NSW, HO); Thunderbolts Lookout, Barrington Tops National Park, 1350 m, *Kantvilas* 452/88, 4.7.1988 (HO, NSW); approximately 1 km west of Mt Banda Banda, 1050 m, *Kantvilas* 487/88, 6.7. 1988 (HO, NSW).

4. *Arthothelium velatius* Müll. Arg. Bull. Herb. Boissier 1: 60 (1893).

Type: 'corticola, ad Bloomfield: *Wilson* 936, ad Oakleigh: *Wilson*, 1586, 1705'. Lectotype (selected here): Victoria: Oakleigh, on *Casuarina*, F.R.M. *Wilson* 1586, 1892 (G!). Isolectotype: Oakleigh, on tree, *Wilson* 1586, 8.8.1887 (NSW!). Syntypes: Victoria: Bloomfield, 1892, *Wilson* 936, 1892 (G!); Oakleigh, *Wilson* 1705, 1892 (G!); Oakleigh, on tree, *Wilson*, 8.8.1887 (MEL 11323).

Thallus thin, rather scurfy, pale mottled grey, lacking a prothallus. Apothecia black, epruinose, scattered, fleck-like, irregularly rounded or \pm stellate-lobed, 0.2–0.4(–1.0) mm diam., \pm immersed. Epithecium olivaceous black-brown, intensifying olive in K. Hymenium colourless, 45–70 μ m thick. Asci clavate to broadly ellipsoid. Spores 8 per ascus, ellipsoid to clavate, sometimes slightly bent, (16.5–)26–37 x 8–13 μ m, muriform, with 8–11 transverse and 2–3(–4) longitudinal septa across the widest part of the spore. Chemistry: thallus UV + pale yellow.

A. velatius is a distinctive corticolous species with muriform spores (Figure 1c), apparently rare or overlooked in New South Wales. All the specimens in G bear the date '1892' but this almost certainly refers to their date of receipt rather than Wilson's date of collection.

SPECIMEN EXAMINED: Central Tablelands: Bowral, *Wilson*, 9.1895 (NSW).

5. *Catillaria tasmanica* Räsänen, Suomal. Eläin-ja Kasvit. Seur. Van. Julk. 21: 3 (1944).
Type: 'Tasmania: prope Newtown Falls, corticola, R.A. *Bastow*, 18.3.1887' (G!).

Catillaria tasmanica is characterised by a thin, pale to dark grey crustose thallus and by black lecideine apothecia, dark brown-black or greenish black, K \pm greenish epithecium, mainly colourless hymenium and hypothecium, and hyaline, 1-septate spores, (17–)20–32(–38) x 9–14(–17) μ m, with a distinct wall 0.8–1.5 μ m thick.

The species is found on smooth bark on young twigs and saplings and appears to be uncommon in New South Wales, being confined mostly to forests above 1300 m. It typically forms mosaics with other crustose lichens such as *Thelotrema lepadinum*, *Tephromela atra* and species of *Lecidea* and *Graphis*. *Catillaria tasmanica* is known also from Tasmania where it is extremely abundant.

SPECIMENS EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 286/88, 30.6.1988 (HO, NSW); Thunderbolts Lookout, Barrington Tops National Park, 1350 m, *Kantvilas* 443/88, 4.7.1988 (HO, NSW); along road from Scone to Barrington at intersection with Quarry Road, 1350 m, *Kantvilas* 467/88 *p.p.*, 4.7.1988 (HO). Southern Tablelands: Parkers Gap near Captains Flat, *Kantvilas s.n.*, 11.5.1986 (HO).

6. *Chiodecton colensoi* (Massal.) Müll. Arg., Bull. Herb. Boissier 2 App. 1: 86 (1894).
Leucodecton colensoi Massal., Bull. Soc. Nat. Moscou 36: 266 (1863).

Chiodecton colensoi is characterised by minute, clustered black apothecia immersed in thalline warts (c. 1–10 per wart), a black-brown, K+ olive-grey cupular exciple, narrowly fusiform, bent, 3-septate spores, 36–56 x 3–4 μ m, and branched, prominent

paraphyses with pale brown, K+ olive-grey apices. The thallus is smooth and often has a pinkish tinge in the field but contains no chemical compounds detectable by t.l.c. A full description of the species is given by Galloway (1985).

Chiodecton colensoi appears to be common in cool temperate rainforest in the Barrington Tops region where it forms extensive thalli on smooth bark, particularly on *Doryphora sassafras* and *Elaeocarpus* sp. Associated lichens include *Megalospora melanoderma*, *Menegazzia eperforata* and species of *Parmelinopsis* and *Heteroderma*. A superficially similar species, differing mainly in having a K+ pale pink hypothecium and hymenium, has been recorded in this habitat as well (*Kantvilas* 620/88). *Chiodecton colensoi* is known also from Tasmania and New Zealand.

SPECIMENS EXAMINED: Northern Tablelands: Burruga Swamp, Mt Allyn Forest Park, 1000 m, *Kantvilas* 205/88, 29.6.1988 (HO, NSW); Gloucester Tops, 1150 m, *Kantvilas* 387/88, 2.7.1988 (HO, NSW); Thunderbolts Lookout, Barrington Tops National Park, 1350 m, *Kantvilas* 451/88, 4.7.1988 (HO, NSW). Southern Tablelands: Monga State Forest near Mongarlowe River, *Kantvilas* s.n., 11.5.1986 (HO).

7. *Coccotrema cucurbitula* (Mont.) Müll. Arg., Nuovo Giorn. Bot. Ital. 21: 51 (1889).
Pertusaria cucurbitula Mont. in Gay, Hist. Fis. Pol. Chile Bot. 8: 200 (1854).

This species is recognised by its rather thick, \pm lumpy, pale cream or grey thallus, apothecia immersed in subglobose, apically perforate thalline warts to c. 1 mm wide, and by the presence of cephalodia which are mostly inconspicuous except in fresh thalli. Spores are simple, hyaline, 8 per ascus, 40–60 x 18–32 μ m. A full description is given by Galloway (1985).

Coccotrema cucurbitula is an austral cool temperate taxon known from southern South America, New Zealand and Tasmania. It appears to be rare in New South Wales and is currently known only from *Nothofagus* forest where it is epiphytic on smooth bark. The species is chemically variable and may require subdivision in the future. Specimens from New South Wales contain stictic and constictic acids (major) \pm norstictic acid (trace). In Tasmania, the species contains only stictic and constictic acids (*Kantvilas* unpublished data) whilst in New Zealand, stictic, norstictic and salazinic acids have been recorded (Galloway 1985). An additional undetermined, related taxon (also present in Tasmania) containing norstictic acid only has been recorded in *Nothofagus* forest in the New England National Park. *C. cucurbitula* is the fertile, non-isidiate counterpart of *C. porinopsis* (see below).

SPECIMENS EXAMINED: North Coast: N.S.W.–Qld border, terminus of Repeater Station Road, c. 2.5 km SW of Springbrook, 1020 m, *Kantvilas* 670/88, 4.7.1988 (HO, NSW). Northern Tablelands: Gloucester Tops, 1150 m, *Kantvilas* 376/88, 2.7.1988 (HO, NSW).

8. *Coccotrema porinopsis* (Nyl.) Imshaug ex Yoshimura, Misc. Bryol. Lichenol. Nichinan 6: 135 (1974).

Verrucaria porinopsis Nyl., J. Linn. Soc. Lond. Bot. 20: 68 (1883).

Thallus pale grey to cream-fawn, composed of densely crowded, erect isidia, simple or occasionally forked, 0.10–0.15 mm thick, 0.5–1 mm tall. Cephalodia abundant, \pm plane to warted-lumpy, irregularly roundish, 0.4–0.6 mm wide. Apothecia immersed singly in subglobose, apically perforated warts to 1 mm diam., absent in New South Wales specimens. Chemistry: stictic,*constictic, norstictic (trace) acids.

Coccotrema porinopsis is a Western Pacific species (Galloway 1985) also known in New Zealand and Tasmania. Although usually lacking apothecia which are diagnostic for the genus as a whole, this species is easily recognised by the presence of cephalodia, its thallus chemistry and isidiate, caespitose habit. The species is recorded from *Nothofagus moorei* in humid forest clearings, associated with *Lobaria isidiophora*, *Parmelinopsis horrescens* and crustose lichens.

SPECIMENS EXAMINED: North Coast: Tweed Range, Wiangerie Forest Drive, Antarctic Beech Walk, 1000 m, *Kantvilas* 646/88, 3.8.1988 (HO, NSW). Northern Tablelands: Burruga Swamp, Mt Allyn Forest Park, 1000 m, *Kantvilas* 235/88, 29.6.1988 (HO, NSW).

9. *Collema fasciculare* (L.) Wiggers var. *fasciculare*, Prim. Fl. Holstat.: 89 (1780). *Lichen fascicularis* L., Mant. Pl. 1: 133 (1767).

Collema fasciculare var. *fasciculare* is a cosmopolitan species [see Degelius (1954) and Galloway (1985) for complete descriptions] characterised by a dark olive-green to blackish, wrinkled, subcrustose thallus when dry, swelling markedly when wet to a prominent, gelatinous, \pm globular cushion. The species occurs in the very wet microhabitats on understorey twigs and tree buttresses. It differs from *C. fasciculare* var. *microcarpum*, which also occurs in New South Wales (Degelius 1974), by the presence of numerous, large apothecia to 2 mm diameter which \pm obscure the thallus, and by the absence of granular isidia.

SPECIMENS EXAMINED: Northern Tablelands: Gloucester Tops, 1150 m, *Kantvilas* 296/88, 2.7.1988 (NSW); Thunderbolts Lookout, Barrington Tops National Park, 1450 m, *Kantvilas* 428/88, 4.7.1988 (HO, NSW).

10. *Collema flaccidum* (Ach.) Ach., Lichenogr. Univers.: 647 (1810). *Lichen flaccidus* Ach., Nov. Act. Reg. Acad. Sci. Holm. 16: 14 (1795).

In his monograph of the genus *Collema*, Degelius (1974) did not formally cite Australasian material of this northern hemisphere species due to a lack of fertile specimens. However, the collections from New South Wales (which are sterile also) accord closely with his published description (Degelius 1954) and with reference specimens from Europe. *C. flaccidum* is a broadly lobate, corticolous species with squamiform, laminal isidia, and is closely related to the more common species, *C. subflaccidum* (see below).

SPECIMENS EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 344/88, 1.7.1988 (HO, NSW). Central Tablelands: Jenolan, *Wilson*, 9.9.1897 (NSW L2243).

11. *Collema subflaccidum* Degelius, Symb. Bot. Upsal. 20: 140 (1974).

Collema subflaccidum is characterised by a broadly lobate, dark olive-green to blackish thallus with laminal, globular to terete isidia. Apothecia are rare, even on a world scale (Degelius 1974), but one specimen from New South Wales has occasional juvenile apothecia with faintly grey pruinose discs that lack mature spores. *C. subflaccidum* occurs typically on fibrous bark, particularly on the buttresses of *Leptospermum* and *Eucalyptus*, and is mostly associated with *Collema subconveniense* and species of *Psoroma* or *Parmeliella*. The species is cosmopolitan but has been commonly overlooked in Australia.

SPECIMENS EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* & *Jarman* 314/88, 30.6.1988 (HO, NSW); Barrington Tops, (no collector) 8.1981 (HO).

12. *Degelia gayana* (Mont.) Arvidsson & D. Galloway, Lichenologist 13: 44 (1981). *Parmelia gayana* Mont., Ann. Sci. Nat., Bot. 3: 58 (1849).

Degelia gayana is characterised by a broadly lobate, lead-grey thallus with a faintly striate upper surface and densely rhizinate, bushy lower surface (see Arvidsson & Galloway 1981). It is prominent on understorey twigs in wet forests and associates with other foliose lichens containing cyanobacteria, e.g. species of *Nephroma*, *Leioderma*,

Pseudocyphellaria, *Parmeliella*, *Psoroma* and *Sticta*. *Degelia gayana* is known also from Victoria, Tasmania, New Zealand, Tristan Da Cunha and southern South America.

SPECIMEN EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, Kantvilas & Jarman 335/88, 1.7.1988 (HO, NSW).

13. *Dimerella lutea* (Dickson) Trevis., Ric. 1st. Lomb. Sci. Lett. 13: 65 (1880).

Lichen luteus Dickson, Fasc. Pl. Cryptog. Brit. 1: 11 (1785).

Dimerella lutea is a cosmopolitan species recognised by its dull green-grey crustose thallus, bright orange, lecideine apothecia and hyaline, narrowly ellipsoid spores, 7–14 x 3–4 µm (see Galloway 1985). It occurs on bark, wood or, rarely, on rock, and is particularly common on tree fern trunks and eucalypt buttresses.

SPECIMENS EXAMINED: Central Coast: Stanwell Park, Hamilton, 6.1909 (NSW). Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, Kantvilas 318/88, 30.6.1988 (NSW, HO, herb. Vezda); Thunderbolts Lookout, Barrington Tops National Park, 1350 m, Kantvilas 454/88, 4.7.1988 (HO, NSW). Central Tablelands: Leura, Hamilton, 11.1909 (NSW).

14. *Fuscoderma amphibolum* (Knight) P.M. Jørg. & D. Galloway, Lichenologist 21: 297 (1989).

Pannaria amphibola Knight, T. N. Z. I. 12: 369 (1880).

Fuscoderma amphibolum is a small, squamulose to subfoliose species with a ± scabrid, blue-grey upper surface, becoming brownish on storage, and coarsely granular, mainly marginal soredia. It is epiphytic, usually amongst bryophytes on *Nothofagus* trunks. A complete account of the species, under the name *Leioderma amphibolum*, is given by Galloway & Jørgensen (1987). *Fuscoderma amphibolum* also occurs in New Zealand, Tasmania and Argentina but fertile specimens are known only from the first region. It is rare in New South Wales where it appears to be at the limit of its range and is confined to high altitude forests above 1100 m.

SPECIMENS EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, Kantvilas 309/88, 30.6.1988 (HO, NSW); Gloucester Tops, 1150 m, Kantvilas 395/88, 2.7.1988 (HO, NSW).

15. *Graphis anfractuosa* Esch. in Martius, Fl. Brasil. 1: 86 (1833).

Lectotype (fide Hayward 1977): Caitété, Brasilien (M); isolectotype (G!).

Thallus crustose, thin, pale greyish white. Lirellae prominent, black, sparingly branched, mostly to 2 mm long. Exciple carbonised, closed below, labia convergent. Hymenium 120–145 µm thick, 1-. Spores 8 per ascus, 9–10-locular, (30-)32–36 x 8–10 µm, 1+ blue. Chemistry: no substances detected.

Graphis anfractuosa is apparently rare in New South Wales where it has been recorded from the twigs of *Doryphora sassafras* in cool temperate rainforest. The species is also known from tropical America (Wirth & Hale 1978), New Zealand (Hayward 1977) and Victoria (Filson 1987). The New South Wales specimen has somewhat shorter lirellae than the type, but this is attributed to its relative youth. The genus *Graphis* is very well-developed in the forests of New South Wales and several superficially similar species have been recorded. *G. anfractuosa* is characterised by a basally closed exciple and ≥9-locular spores, and by its thallus chemistry.

SPECIMEN EXAMINED: Northern Tablelands: Burruga Swamp, Mt Allyn Forest Park, 1000 m, Kantvilas 195/88, 20.6.1988 (HO, NSW).

16. *Graphis librata* Knight, T. N. Z. I. 16: 404 (1884).

Lectotype (fide Hayward 1977): New Zealand: *sine loco*, ? Wellington, Charles Knight 67: 23 (WELT!).

Graphis librata is closely related to *G. scripta* (L.) Ach. of the northern hemisphere and its relationships with the taxa in this species complex are discussed by Wirth & Hale (1978). It is characterised by the presence of norstictic acid, black, flexuose lirellae with a basally open exciple and convergent lips, and by (5-)7(-9) locular spores, 16-26(-31) x 6-9 µm. The species typically occurs on young trunks of *Nothofagus* or *Doryphora*. It is known also from Tasmania, New Zealand and Dominica, and further descriptive details are given by Hayward (1977) and Wirth & Hale (1978). In both New South Wales and Tasmania, *Graphis librata* co-occurs with a second species which is distinguished only by the absence of norstictic acid.

SPECIMENS EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 295/88, 30.6.1988 (HO, NSW) (*G. librata* s.str.); Gloucester Tops, 1150 m, *Kantvilas* 422/88, 2.7.1988 (HO, NSW) (without norstictic acid). Central Tablelands: Mt Wilson, Blue Mts., *Kantvilas* s.n., 8.5.1988 (HO) (without norstictic acid).

17. *Leioderma pycnophorum* Nyl., Lich. Nov. Zel.: 47 (1888).

See Galloway and Jørgensen (1987) for a full description. *Leioderma pycnophorum* is a characteristic austral cool temperate lichen known from southern South America, Tristan da Cunha, New Zealand, Tasmania and Victoria. It appears to be very rare in New South Wales where it is recorded on the twigs of *Lomatia arborescens* beneath a broken *Nothofagus moorei* canopy. The species is associated typically with a very diverse assemblage of conspicuous macrolichens including *Degelia gayana*, *Stricta fuliginosa* and species of *Nephroma*, *Pseudocyphellaria* and the Collemataceae.

The genus *Leioderma* is well represented in New South Wales with two further species, *L. sorediatum* and *L. duplicatum* present mostly in warm temperate forests.

SPECIMEN EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, *Kantvilas & Jarman* 336/88, 1.7.1988 (NSW).

18. *Maronea constans* (Nyl.) Hepp, Fl. Eur.: 771 (1860).

Lecanora constans Nyl., Mém. Soc. Natn. Sci. Nat. Cherbourg 3: 199 (1855).

Thallus thinly crustose to ± granular, pale grey-green to brown, lacking a prothallus. Apothecia lecanorine, to 0.6(-1.0) mm diam.; disc plane, dark reddish brown, epruinose; thalline margin thin, crenulate when young. Epithecium red-brown, K-; hymenium and hypothecium colourless. Paraphyses simple or occasionally forked near the apices. Spores numerous per ascus, ellipsoid with rounded apices, simple or spuriously 1-septate, 4-7 x 2-4 µm.

Maronea constans is a cosmopolitan species, recorded previously in Australia from Victoria, Tasmania and South Australia (Filson 1988). It typically occurs in open situations such as on trees in pasture, but it is rare in closed forests where it is confined to canopy twigs. Specimens from such sheltered sites may resemble *Tephromela atra*, a species which is frequently sympatric but differs in having larger apothecia and spores which are 8 per ascus.

SPECIMENS EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 311/88, 30.6.1988 (HO, NSW); approximately 1 km west of Mt Banda Banda, 1050 m, *Kantvilas* 635/88, 6.7.1988 (NSW).

19. *Menegazzia eperforata* P. James & D. Galloway, N. Z. J. Bot. 21: 194 (1983).

Menegazzia eperforata is well characterised by a green-grey to suffused brownish olive-green upper cortex which lacks the perforations typical of the genus, and by the

presence of slender isidia. It is the most common species of *Menegazzia* in cool temperate rainforest in New South Wales where it occurs on the lower trunks of *Nothofagus moorei* and other trees in moderate shade. It is associated frequently with the related perforate, sorediate species, *M. nothofagi*. *M. eperforata* also occurs in Tasmania where it is uncommon, and New Zealand and Lord Howe Island. A superficially similar, undescribed, isidiate species with scattered perforations has been collected in the Tweed Range (*Kantvilas* 639/88).

SPECIMENS EXAMINED: Northern Tablelands: New England National Park, c. 3 km west of Point Lookout, 1500 m, *Kantvilas* 659/88, 6.8.1988 (NSW); Cascade Creek near Wrights Lookout, New England National Park, 1300 m, *Kantvilas* 671/88, 6.8.1988 (NSW); Burruga Swamp, Mt Allyn Forest Park, 1000 m, *Kantvilas* 200/88, 29.6.1988 (NSW, HO); Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 268/88, 30.6.1988 (NSW); Gloucester Tops, 1150 m, *Kantvilas* 367/88, 2.7.1988 (HO, NSW); Thunderbolts Lookout, Barrington Tops National Park, 1350 m, *Kantvilas* 436/88, 4.7.1988 (HO, NSW); approximately 1 km west of Mt Banda Banda, 1050 m, *Kantvilas* 476/88, 6.7.1988 (HO, NSW). Southern Tablelands: Monga State Forest near Mongarlowe River, *Kantvilas s.n.*, 11.5.1986 (HO).

20. *Nephroma australe* A. Rich., Voy. Astrolabe Bot. Pars 1: 31 (1832).

Nephroma australe is the only Australasian species of *Nephroma* containing a green photobiont (see White & James 1988 for complete description). It is common on understorey twigs in cool temperate rainforest and wet sclerophyll forest in Tasmania, New Zealand and Victoria but appears to have been overlooked in New South Wales. Associated lichens typically include *Degelia gayana*, *Nephroma helveticum* and species of *Pseudocyphellaria* and *Psoroma*.

SPECIMENS EXAMINED: Northern Tablelands: along road from Scone to Barrington at junction with Quarry Rd, 1350 m, *Kantvilas* 466/88, 4.7.1988 (HO, NSW); Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 332/88, 1.7.1988 (HO, NSW).

21. *Nephroma cellulorum* var. *isidioferum* J. Murray, Trans. R. Soc. N.Z. 88: 385 (1960).

This taxon is recognised by its deeply faveolate, dark brownish to grey (blue-green when wet) upper surface, glabrous, bullate, cream-coloured lower surface, and brown to red-brown adnate apothecia. Terete to squamiform isidia on the ridges of the faveolae, along the lobe margins and fringing the apothecia distinguish it from *N. cellulorum* var. *cellulosum*. This lichen has not been recorded previously from Australia (White & James 1988) although it occurs in South America and New Zealand. The type variety, with which it usually co-occurs, is widespread in the cool temperate Southern Hemisphere.

SPECIMEN EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, *Kantvilas & Jarman* 333/88, 1.7.1988 (HO, NSW, BM).

22. *Parmelia salcrambidiocarpa* Hale, Smithson. Contr. Bot. 66: 38 (1987).

Parmelia salcrambidiocarpa is recognised by its relatively elongate, sublinear lobes, marginal and laminal pseudocyphellae, dense rhizines often forming a fringe protruding from beneath the thallus margins, and by the presence of atranorin and salazinic acid (see Hale 1987 for a complete description). It is similar to *P. tenuirima*, a very common corticolous species in New South Wales, but differs in being more delicate and regularly lobed. Previously known only from Tasmania and New Zealand, its occurrence in New South Wales at high altitudes exclusively on *Nothofagus* is consistent with its ecology in Tasmania.

SPECIMENS EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m,

Kantvilas 271/88, 30.6.1988 (HO, NSW, ANUC); Thunderbolts Lookout, Barrington Tops National Park, 1350 m, *Kantvilas* 455/88, 4.7.1988 (HO, NSW, ANUC).

23. *Pertusaria novaezealandiae* Szatala, Borbasia 1: 60 (1939).

Pertusaria novaezealandiae is best characterised by its thick, grey-white crustose thallus containing hypothamnolic acid (medulla K+ purple, UV+ white). It has prominent, apically soreciate verrucae containing immersed apothecia, with one spore per ascus, (52-)84-150×(14-)22-56 µm with walls 5-8 µm thick. It is very common in New South Wales, frequently being the dominant lichen on the canopy branches of *Nothofagus moorei* in cool temperate rainforest. It is the ecological analogue of *Pertusaria truncata*, a superficially similar species (8 spores per ascus, medulla KC+ pink) which occupies this habitat in rainforests in Tasmania and New Zealand. *P. novaezealandiae* is typically associated with *Parmelia tenuirima*, *Haematomma infusum*, *Tephromela atra*, *Relicina filsonii* and species of *Usnea*. It also occurs in Tasmania and New Zealand.

SPECIMENS EXAMINED: Northern Tablelands: New England National Park, Cascade Creek near Wrights Lookout, 1300 m, *Kantvilas* 673/88, 6.8.1988 (HO, NSW); approximately 1 km east of Mt Allyn, 960 m, *Kantvilas* 183/88, 28.6.1988 (HO, NSW); Burruga Swamp, Mt Allyn Forest Park, 1000 m, *Kantvilas* 188/88, 29.6.1988 (HO, NSW); Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 292/88, 30.6.1988 (HO, NSW) *Kantvilas* 343/88, 1.7.1988 (HO, NSW); Gloucester Tops, 1150 m, *Kantvilas* 388/88, 2.7.1988 (HO, NSW); Thunderbolts Lookout, Barrington Tops National Park, 1350 m, *Kantvilas* 440/88, 4.7.1988 (HO, NSW); approximately 1 km west of Mt Banda Banda, 1050 m, *Kantvilas* 475/88, 6.7.1988 (NSW). New England National Park, c. 3 km west of Point Lookout, 1500 m, *Kantvilas* 660/88, 6.8.1988 (HO, NSW). Southern Tablelands: Monga State Forest near Mongarlowe River, *Kantvilas* s.n., 11.5.1986 (HO).

24. *Phaeographis exaltata* (Mont. & v.d. Bosch) Müll. Arg., Flora 65: 336 (1882). *Lecanactis exaltata* Mont. & v.d. Bosch, Pl. Junghuhn 4: 475 (1857).

Phaeographis exaltata is recognised by its thick, grey to creamish or olivaceous grey thallus, robust, prominent lirellae, usually with a conspicuous black or grey-pruinose disc, and consistently 6(-7)-locular, brownish spores, 22-38 × 10-12 µm. Its chemistry does not include any substances detectable by t.l.c. *P. exaltata* is very common in New South Wales on smooth shaded trunks in rainforest. It is a widespread pantropical lichen and further descriptive data are given by Hayward (1977) and Wirth & Hale (1978). An unidentified, superficially similar species with smaller spores and containing norstictic acid has been recorded in similar habitats (*Kantvilas* 669/88).

SPECIMENS EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 285/88, 30.6.1988 (HO, NSW); Gloucester Tops, 1150 m, *Kantvilas* 416/88, 2.7.1988 (HO, NSW); Thunderbolts Lookout, Barrington Tops National Park, 1350 m, *Kantvilas* 444/88, 4.7.1988 (HO, NSW); approximately 1 km west of Mt Banda Banda, 1050 m, *Kantvilas* 489/88, 6.7.1988 (NSW); New England National Park, c. 3 km west of Point Lookout, 1500 m, *Kantvilas* 657/88, 658/88, 6.8.1988 (HO, NSW).

25. *Phlyctis subuncinata* Stirton, J. Linn. Soc. Lond. Bot. 14: 464 (1875).

Phlyctis wilsonii Müll. Arg., Bull. Herb. Boissier 1: 43 (1893).

Isotype: Victoria: Mt Macedon, on tree, *F.R.M. Wilson* 830, 9.5.1885 (NSW!).

Phlyctis subuncinata is common in New South Wales on smooth bark in humid, shaded forest habitats [see Galloway (1985) for a complete description]. Typical hosts include *Doryphora sassafras*, *Orites excelsa* and young *Nothofagus moorei*. Although most specimens are sterile, the species is recognised by its pale grey thallus containing stictic acid (K+ yellow, PD+ orange) with scattered, white, soreciate patches which typically

signify the location of immersed apothecia. However, a potentially confusing, unidentified species containing psoromic acid (PD+ yellow) (*Kantvilas* 661/88) is known from similar habitats.

SPECIMENS EXAMINED: Central Coast: Hornsby, *Wilson*, 9.1897 (NSW). Northern Tablelands: Mt Allyn Forest Park, start of track to Burruga Swamp, 980 m, *Kantvilas* 171/88, 28.6.1988 (HO, NSW); Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 328/88, 30.6.1988 (NSW, HO); Gloucester Tops, 1150 m, *Kantvilas* 405/88, 2.7.1988 (HO, NSW); approximately 1 km west of Mt Banda Banda, 1050 m, *Kantvilas* 490/88, 6.7.1988 (NSW).

26. *Pseudocyphellaria rubella* (*J.D. Hook. & Taylor*) *D. Galloway & P. James*, *Lichenologist* 12: 302 (1980).

Sticta rubella *J.D. Hook. & Taylor*, *Hook. Lond. J. Bot.* 3: 649 (1844).

This distinctive foliose species is recognised by its silky tomentose upper surface which is grey to brown when dry but bright green when wet, and by its yellow medulla and granular soredia (see Galloway 1988). It appears to be rare in New South Wales, although common in New Zealand and Tasmania in *Nothofagus* forest and related vegetation. It occurs on trunks and twigs in humid, brightly lit habitats such as in forest clearings.

SPECIMENS EXAMINED: North Coast: Tweed Range, Wiangerie Forest Drive, Antarctic Beech Walk, 1000 m, *Kantvilas* 642/88, 3.8.1988 (NSW). Northern Tablelands: along road from Barrington to Scone, at junction with Quarry Road, 1350 m, *Kantvilas* 460/88, 4.7.1988 (NSW); Mt William, Barrington Tops National Park, 1400 m, *Kantvilas & Jarman* 331/88, 30.6.1988 (HO, NSW).

27. *Psoroma asperellum* *Nyl.*, *Syn. Meth. Lich.* 2: 24 (1863).

Thallus squamulose. Squamules discrete and \pm dispersed, or imbricate, often on a thin black prothallus, flat or ascending, rounded, crenate, incised or lobulate, mostly <1 mm across, bright green when wet, pale greyish green when dry. Cephalodia usually abundant, pale blue-grey when wet, inconspicuous when dry, convex or flat and \pm squamulose. Apothecia 0.5–1.5 mm diam. Disc pale orange-pink to orange-brown, plane to convex. Thalline margin crenulate, occasionally \pm squamulose. Hymenium I+ brown-red. Spores simple, hyaline, ellipsoid, (14–)16–23 \times 7–10 μm , with a minutely roughened, warted epispore.

Psoroma asperellum is typically corticolous amongst bryophytes on mature tree trunks in wet forests, and is commonly associated with *Pseudocyphellaria glabra* and *Sphaerophorus* spp. It appears to be occasional in New South Wales where it is known from *Nothofagus moorei* and *Bedfordia arborescens* but is common in Tasmania, Victoria and New Zealand [see Galloway (1985) for further descriptive data]. The species was described originally from South Africa. It is rather similar to *Psoroma pholidotoides*, a more common species in New South Wales with contiguous, \pm coalescing squamules and spores with a smooth epispore and prominent \pm rounded, apiculate apices.

SPECIMENS EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 305/88, 30.6.1988 (HO, NSW). Southern Tablelands: Parkers Gap near Captains Flat, *Kantvilas s.n.*, 11.5.1986 (HO).

28. *Pyrenula galactina* (*Shirley*) *Kantvilas*, *Pap. Proc. R. Soc. Tasmn.* 122: 66 (1988). *Pseudopyrenula galactina* *Shirley*, *Pap. Proc. R. Soc. Tasm.* (1893): 219 (1894). Holotype: Tasmania: St. Crispins, on bark, *W.A. Weymouth* 113 (BRI!).

Pyrenula galactina is characterised by a rather thick, pale yellowish grey, UV+ dull orange-yellow thallus, \pm immersed perithecia and pale brown, 4-locular spores, 14–22(–26) \times 5–10 μm [see *Kantvilas* (1988) for a full description]. The species is known in New South Wales from a single collection from understorey twigs of

Nothofagus moorei in rainforest. This specimen accords closely with the type from Tasmania.

SPECIMEN EXAMINED: Northern Tablelands: Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 297/88, 30.6.1988 (HO, NSW).

29. *Sticta limbata* (Sm.) Ach., Meth. Lich.: 280 (1803).

Lichen limbatus Sm. in Sm. & Sowerby, Engl. Bot. 16: 1104 (1803).

Sticta limbata is a cosmopolitan species characterised by a \pm monophyllous, brown-grey thallus (tinged blue-green when wet), with pale fawn-brown tomentum on the undersurface and marginal and laminal pale blue-grey soralia [see Galloway (1985) for full description]. It occurs on understorey twigs and tree buttresses in very wet, humid, open forests, where it is associated with *Collema subconveniense*, *Nephroma cellulolum*, *Pseudocyphellaria crocata* and other lichens containing cyanobacteria. In Australasia, the species is known from New Zealand, Tasmania, Queensland and Victoria (Filson 1988).

SPECIMEN EXAMINED: Northern Tablelands: Thunderbolts Lookout, Barrington Tops National Park, 1450 m, *Kantvilas* 424/88, 4.7.1988 (NSW).

30. *Trapeliopsis granulosa* (Hoffm.) H.T. Lumbsh, in Hertel, Lecideaceae Exsiccatae Fasc. 5: 99 (1983).

Verrucaria granulosa Hoffm., Descr. adumbr. Pl. Lich. 2: 21 (1794).

Thallus crustose, composed of minute, dark to pale green, contiguous granules, usually \pm microphylline at margins, KC+ red, C+ red (frequently very faintly). Apothecia lecideine, to 0.8 mm diam., pale orange-brown to pink-brown with a paler proper margin. Spores simple, hyaline, ellipsoid, (8-)9.5-12 x 4.5-6 μ m. Chemistry: gyrophoric acid.

See Coppins & James (1984) and Galloway (1985) for further descriptions. *Trapeliopsis granulosa* is a cosmopolitan species occurring mostly on rotting wood, humus or on tree buttresses. It is occasional in New South Wales on the buttresses of *Nothofagus moorei* in cool temperate rainforest, but it is probably overlooked elsewhere. Specimens from New South Wales are relatively poorly developed and mainly esorediate.

SPECIMENS EXAMINED: Northern Tablelands: New England National Park, c. 3 km west of Point Lookout, 1500 m, *Kantvilas* 656/88, 6.8.1988 (HO, NSW); Mt William, Barrington Tops National Park, 1400 m, *Kantvilas* 304/88, 30.6.1988 (HO, NSW); Gloucester Tops, 1150 m, *Kantvilas* 421/88, 2.7.1988 (HO, NSW); approximately 1 km west of Mt Banda Banda, 1050 m, *Kantvilas* 484/88, 6.7.1988 (HO, NSW).

Acknowledgements

I thank Dr J.A. Elix, Dr S.J. Jarman and Ms J. Johnston for critical reading of drafts of the manuscript and for helpful discussion on selected taxa, and Mr J. Williams for assistance in the field. A research fellowship from the Royal Botanic Gardens, Sydney, Trust funded collecting and study within New South Wales, and I thank the Director and staff of the National Herbarium of N.S.W. for their support during that time. Financial support from the National Research Fellowships Scheme is also acknowledged.

References

- Arvidsson, L. & Galloway, D.J. (1981) *Degelia*, a new lichen genus in the Pannariaceae. *Lichenologist* 13: 27-50.
- Coppins, B.J. & James, P.W. (1979) New or interesting British lichens III. *Lichenologist* 11: 27-45.
- Coppins, B.J. & James, P.W. (1984) New or interesting British Lichens V. *Lichenologist* 16: 241-264.
- Degelius, G. (1954) The lichen genus *Collema* in Europe. Morphology, taxonomy, ecology. *Symb. Bot. Upsal.* 13: 1-499.
- Degelius, G. (1974) The lichen genus *Collema* with special reference to extra-European species. *Symb. Bot. Upsal.* 20: 1-215.
- Filson, R.B. (1987) *A Census of the non-vascular plants of Victoria I: Lichens* (National Herbarium of Victoria: Melbourne)
- Filson, R.B. (1988) *Checklist of Australian Lichens* 3rd Edition (National Herbarium of Victoria: Melbourne).
- Galloway, D.J. (1985) *Flora of New Zealand Lichens* (Wellington: Government Printer)
- Galloway, D.J. (1988) Studies in *Pseudocyphellaria* (lichens) 1. The New Zealand species. *Bull. Br. Mus. Nat. Hist. (Bot.)* 17: 1-267.
- Galloway, D.J. & Jørgensen, P.M. (1987) Studies in the lichen family Pannariaceae II. The genus *Leioderma* Nyl. *Lichenologist* 19: 345-400.
- Hale, M.E. (1987) A monograph of the lichen genus *Parmelia* Acharius sensu stricto (Ascomycotina: Parmeliaceae). *Smithson. Contr. Bot.* 66: 1-55.
- Hayward, G.C. (1977) Taxonomy of the lichen families Graphidaceae and Opegraphaceae in New Zealand. *New Zealand J. Bot.* 15: 565-584.
- Kantvilas, G. (1988) A re-examination of John Shirley's collection of Tasmanian lichens. *Pap. Proc. R. Soc. Tasm.* 122: 59-67.
- Kantvilas, G. (1989) A checklist of Tasmanian lichens. *Pap. Proc. R. Soc. Tasm.* 123: 67-85.
- Weber, W.A. & Wetmore, C.M. (1972) Catalogue of the lichens of Australia exclusive of Tasmania. *Beih. Nova Hedwigia* 41: 1-137.
- White, F.J. & James, P.W. (1985) A new guide to microchemical techniques for the identification of lichen substances. *Brit. Lich. Soc. Bull. (suppl.)* 57: 1-41.
- White, F.J. & James, P.W. (1988) Studies on the genus *Nephroma* II. The southern temperate species. *Lichenologist* 20: 103-166.
- Wirth, M. & Hale, M.E. (1978) Morden-Smithsonian expedition to Dominica: The Lichens (Graphidaceae). *Smithson. Contrib. Bot.* 40: 1-64.

Manuscript received 5 September 1989

Manuscript accepted 6 February 1990