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Two new corticolous species of *Amandinea* (Ascomycota, Physciaceae) from New Zealand

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Abstract: *Amandinea ornata* Ropin, H.Mayrhofer & Elix and *A. ropinii* H.Mayrhofer & Elix are reported as new to science. In addition, *Amandinea lignicola* var. *australis* Elix & Kantvilas and *A. pillagaensis* Elix & Kantvilas are reported for the first time from New Zealand. A key to the corticolous species of *Amandina* in New Zealand is provided.

In his revised second edition of the *Flora of New Zealand Lichens*, Galloway recorded a total of seven species of *Amandinea* (Galloway, 2007), three of which occur on bark or wood. Since then one of those species has been transferred to the new genus *Orcularia* as *O. insperata* (Nyl) Kalb & Giralt (Kalb & Giralt 2011), and *Buellia porulosa* Nyl. has been transferred to *Amandinea* (Elix *et al.* 2015). In this paper, we describe two new corticolous species of *Amandinea*, and report two new records for New Zealand. *Amandinea ropinii* is also recorded for New South Wales.

Methods

Observations and measurements of photobiont cells, thallus and apothecium anatomy, asci and ascospores were made on hand-cut sections mounted in water and 10% KOH (K). Asci were also observed in Lugol's Iodine (I), with and without pretreatment in K. Medullary sections were treated with 10% sulfuric acid (H_2SO_4), and apothecial sections with 50% nitric acid (N).

The new species

1. Amandinea ornata Ropin, H.Mayrhofer & Elix, sp. nov. Figs 1, 2
MycoBank number: **MB 815808**

Similar to *Amandinea subduplicata* (Vain.) Marbach, but differs in having initially lecanorine apothecia, smaller ascospores, and an absence of atranorin.

Type: New Zealand, North Island, South Auckland, Stoney Point, Lake Tarawera, SE of Rotorua, 38°11'S, 176°24'E, on *Populus*, *H. Mayrhofer 11974 & E. Hierzer*, 18.viii.1992 (holotype – GZU; isotype – WELT).

Thallus crustose, continuous to rimose-areolate, to 10 mm wide and 0.05 mm thick; upper surface white, smooth, matt, becoming ±wrinkled, ridged or slightly granular; prothallus not apparent; medulla white, lacking calcium oxalate (H_2SO_4–), I–; photobiont cells 5–12 µm diam. *Apothecia* 0.2–0.6 mm wide, initially immersed, erumpent, with an accessory thalline margin that is soon excluded, then biatorine or lecideine, broadly adnate or sessile, separate or in small groups; disc black, epruinose, weakly

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concave then plane or weakly convex; proper exciple thick, tumid at first, raised above the disc, thinner and indistinct in older convex apothecia, in section outer zone dark brown, 45–55 μm thick, K–, N–, inner zone pale brown. *Epihymenium* 10–12 μm thick, dark brown, K–, N–. *Hypothecium* pale brown to brown, 70–80 μm thick, K–. *Hymenium* 60–90 μm thick, colourless, not inspersed with oil droplets; paraphyses 1–1.5 μm wide, sparsely branched, with apices 4–5 μm wide and brown caps; asci of the *Lecanora*-type, 8-spored. *Ascospores Physconia*-type when immature, *Buellia*-type when mature, brown, ellipsoid, 14–[*17.2*]–21 × 6–[*7.7*]–9 μm, older spores constricted at septum; outer spore-wall strongly ornamented. *Pycnidia* immersed, ostiole black; conidia filiform, curved, 20–30 × 0.7–1 μm.
Chemistry: Thallus K–, P–, C–, UV–; no lichen substances detected.

Etymology: This species is named for its prominently ornamented ascospore walls.

Remarks
The new species is characterized by the crustose, smooth to rimose-areolate, white thallus, the erumpent apothecia that are initially lecanorine, then biatorine but ultimately lecideine and adnate to sessile, the 1-septate, *Physconia*- then *Buellia*-type ascospores that become constricted at the septum and have strongly ornamented outer walls, and the absence of lichen substances. Morphologically, it closely resembles *A. subduplicata* (Marbach 2000, Giralt *et. al.* 2015), but that species has somewhat longer ascospores, 15–[*19.4*]–24 μm, and contains atranorin.

Amandinea ornata is known from two localities in New Zealand, where it grows on the bark of introduced trees. Associated species include *Caloplaca cerinella* (Nyl.) Flagey, *Candelariella xanthostigma* (Pers.) Lettau, *Lecanora dispersa* (Pers.) Sommerf., *Hyperphyscia adglutinata* (Flörke) H.Mayrhofer & Poelt, *Lecanora flavopallida* Stirt., *Physcia adscendens* H.Olivier, *P. jackii* Moberg, *Ramalina celastri* (Spreng.) Krog & Swinscow, *Rinodina pyrina* (Ach.) Arnold, *Teloschistes velifer* F.Wilson, *Xanthoria incavata* (Stirt.) Zahlbr. and *X. parietina* (L.) Th.Fr.

SPECIMENS EXAMINED
North Island: • type locality, *H. Mayrhofer 11977*, *11982 & E. Hierzer*, 13.viii.1992 (GZU). *South Island*: • Nelson, Golden Bay, E of Takaka, 40°51′30″S, 172°49′30″E, c. 20 m alt., on *Crataegus* sp., *H. Mayrhofer 11975*, *11981*, 28.viii.1992 (GZU).

2. Amandinea ropinii H.Mayrhofer & Elix, sp. nov. Figs 3, 4
MycoBank number: **MB 815809**

Similar to *Amandinea stajsicii* Elix & Kantvilas, but differs in having lecanorine apothecia that become biatorine and ultimately lecideine, and different ascospore ontogeny.

Type: New Zealand, North Island, Wellington, Waser Bay, Mirimar Peninsula, E of Wellington, 41°19′S, 174°49′E, on *Coprosma repens*, *H. Mayrhofer 12018*, *D. Glenny*, *W. Nelson*, *B. Polly & C. West*, 22.viii.1992 (holotype – GZU, isotype – WELT).

Thallus crustose, continuous, membranaceous to rimose or rimose-areolate, to 10 mm wide and 0.05 mm thick; upper surface white, pale grey, olive or grey-brown, smooth, matt, becoming ±verruculose or granular; prothallus not apparent; medulla white, lacking calcium oxalate (H_2SO_4–), I–; photobiont cells 8–15 μm diam. *Apothecia* 0.2–0.5 mm wide, initially lecanorine, then biatorine and ultimately lecideine, with an accessory thalline margin that is soon excluded, broadly adnate or rarely sessile, separate or in small groups, sometimes crowded and distorted by mutual pressure; disc black, epruinose, weakly concave then plane or weakly convex; proper exciple thick and tumid at first, thinner with age, persistent, in section outer zone dark brown to brown-black, 25–50 μm thick, K–, N–, inner zone pale brown. *Epihymenium* 10–12 μm thick, olive-brown to dark brown, K–, N–. *Hypothecium* pale brown to brown, 50–75 μm thick, K–. *Hymenium* 70–80 μm thick, colourless, not inspersed with oil droplets; paraphyses 1–1.5 μm wide, sparsely branched, with apices 5–8 μm wide and brown caps; asci of the *Bacidia*-type, 8-spored. *Ascospores* initially with lachrymiform locules, then *Physconia*-type, *Buellia*-type when mature, olive-brown to brown, ellipsoid, 10–[*12.9*]–17 × 5–[*6.1*]–8 μm, older spores constricted at the septum; outer spore wall smooth. *Pycnidia* immersed, ostiole black; conidia filiform, weakly curved, 15–20 × 0.7–1 μm. *Chemistry*: Thallus K–, P–, C–, UV–; no lichen substances detected.

Etymology: This species is named after Dr Klaus Ropin for his pioneering work on the corticolous species of *Amandinea* in New Zealand.

Remarks
This new species closely resembles *A. stajsicii* Elix & Kantvilas, from southern Australia and Norfolk Island (Elix & Kantvilas 2013), but differs in the development of its apothecia and ascospores. In *A. ropinii*, apothecia are initially pseudolecanorine (biatorine), but then become lecideine, where the thalline exciple, which is initially concolorous with the thallus, is soon reduced or excluded. In contrast, in *A. stajsicii*, the apothecia are invariably broadly adnate and lecideine throughout all stages of development. At certain stages of their ontogeny, the ascospores of the two species are superficially similar. However, in early ontogeny the locules of the ascospores of *A. stajsicii* appear to have an elongate, almost inter-connecting canal, but that stage is never observed in *A. ropinii*, where the locules are initially lachrymiform or turbinate. The mature ascospores of both species soon become *Physconia*-type and ultimately *Buellia*-type.

Amandinea ropinii is common in temperate areas of New Zealand, where it grows on twigs or bark of shrubs and trees. It is also known from one locality in Australia. Associated species in New Zealand include *Caloplaca cerinella* (Nyl.) Flagey, *Candelariella xanthostigma* (Pers.) Lettau, *Lecanora dispersa* (Pers.) Sommerf., *Hyperphyscia adglutinata* (Flörke) H.Mayrhofer & Poelt, *Lecanora flavopallida* Stirt., *Physcia adscendens* H.Olivier, *P. jackii* Moberg, *Rinodina pyrina* (Ach.) Arnold, *Teloschistes velifer* F.Wilson, *Xanthoria incavata* (Stirt.) Zahlbr. and *X. parietina* (L.) Th.Fr.

SPECIMENS EXAMINED
AUSTRALIA: *New South Wales*: • Great Dividing Range, Jenolan Caves, SW of Katoomba, 33°50′S, 150°00′E, c. 800 m alt., on twigs, *M.* & *H. Mayrhofer 5355*, 30.ix.1981 (GZU).
NEW ZEALAND: *North Island*: • Hawkes Bay, 5 km NW of Mohaka River Bridge, 16 km NW of Te Pohue, 39°10′S, 176°37′E, c. 260 m alt., on *Populus* sp., *H. Mayrhofer 11962 & E. Hierzer*, 16.viii.1992 (GZU); • Wellington, Te Rewarewa Point, Hongoeka Bay, NW of Plimmerton, 41°04′S, 174°51′E, sea level, on driftwood, *H. Mayrhofer 12013*, *D. Glenny*, *W. Nelson*, *B. Polly & C. West*, 23.viii.1992 (GZU). *South Island*: • Nelson, Uruwhenua Reserve, N of Upper Takaka, c. 80 m alt., 40°59′S, 172°49′30″E, c. 80 m alt., on *Populus* sp., *H. Mayrhofer 11950*, 28.viii.1992 (GZU); *loc. id.*, on *Melicytus* sp., *H. Mayrhofer 12016*, 28.viii.1992 (GZU); • Nelson, Ataata Point, Cable Bay, NE of Nelson, 41°09′30″S, 173°24′E, c. 7 m alt., on twigs of shrub, *H. Mayrhofer 11985*, *N. & W. Malcolm & B. Polly*, 25.viii.1992 (GZU); • Canterbury, Canterbury Plains, Bankside Scientific Reserve, SE of Bankside, 41°09′30″S, 173°24′E, c. 70 m alt., on twigs, *H. Mayrhofer 9016*, *H. Hertel*, *C.D. Meurk & B.P.J. Molloy*, 14.i.1985 (GZU); • Canterbury, limestone outcrops, E of Coringa Station, NW of Motunau Beach, 43°02′S, 173°02′E, c. 150–200 m alt., on *Melicytus alpinus*, *H. Mayrhofer 12017 & C.D. Meurk*, 2.ix.1992 (GZU); • Otago, Tavora Reserve, near Goodwood, 45°31′54″S, 170°45′27″E, 3 m alt., on twigs of *Plagianthus divaricatus* at edge of saltmarsh, *A. Knight*, 7.vi.2014 (CANB, OTA).

New records

1. Amandinea lignicola var. **australis** Elix & Kantvilas, *Australasian Lichenol*ogy **72**, 7 (2013)

Amandinea lignicola var. *australis* is a very distinctive taxon that is common in southern Australia. It is typically distinguished by having a conspicuous, well-developed, pale grey to blue-grey or olive-brown, crustose to squamulose thallus with a smooth to often granular or sorediate upper surface. It is further characterized by having a non-inspersed hymenium, *Physconia*- then *Buellia*-type, 1-septate, ellipsoid ascospores, (11–)13–20 × (5–)6–8 µm, with a smooth to weakly ornamented outer wall, curved, filiform conidia (12–)18–26 × 0.5–1 µm, and by the absence of lichen substances. A detailed description is given in Elix & Kantvilas (2013).

SPECIMEN EXAMINED
North Island: • Wellington, Te Rewarewa Point, Hongoeka Bay, NW of Plimmerton, 41°04'S, 174°51'E, sea level, on driftwood, *H. Mayrhofer 12013A*, *D. Glenny*, *W. Nelson*, *B. Polly & C. West*, 23.viii.1992 (GZU).

2. Amandinea pillagaensis Elix & Kantvilas, *Australasian Lichenol*ogy **72**, 10 (2013)

This species was previously known from eastern Australia. It is characterized by the thin, crustose, white to pale grey thallus, the 4–8-spored asci, the 1-septate, ellipsoid then broadly fusiform, *Buellia*-type ascospores, 17–25 × 7–12 µm, often pointed at the apices, with ±pronounced apical wall thickenings (as in *Cratiria*), with a smooth outer wall, the inspersed hymenium, the curved filiform conidia, 25–38 × 0.4–0.6 µm, and by the absence of lichen substances, or rarely with traces of atranorin. A detailed description is given in Elix & Kantvilas (2013).

SPECIMEN EXAMINED
South Island: • Canterbury, Lewis Park National Park, Nina Valley walking track, on trunk of *Nothofagus solandri* in *Nothofagus* forest, *J. Johnston 3471 & R. Elder*, 8.xi.1989 (CANB).

Key to the corticolous and lignicolous species of *Amandinea* in New Zealand

1 Thallus yellow; medulla C+ orange, UV+ orange, containing xanthones 2
1: Thallus white, grey or brown; medulla C–, UV–, not containing xanthones .. 3

2 Asci 16-spored; ascospores 9–12 × 4–5.5 µm ..... **A. melaxanthella**
2: Asci 8-spored; ascospores 11–14 × 4.5–6 µm ..... **A. diorista** var. **hypopelidna**

3 Ascospores without medial thickenings; spores 12–15 × 7–9 µm ... **A. punctata**
3: Ascospores with medial thickening during spore ontogeny, but often quickly reduced 4

4 Ascospores 14–25 µm long 5
4: Ascospores 10–16 µm long..... 7

5 Apothecia initially lecanorine, then biatorine and lecideine; ascospores 14–21 × 6–9 µm..... **A. ornata**
5: Apothecia lecideine throughout development 6

6 Ascospores 17–25 × 7–12 µm, with apical thickenings..... **A. pillagaensis**
6: Ascospores 14–20 × 6–8 µm, without thickenings .... **A. lignicola** var. **australis**

7 Apothecia initially lecanorine, then biatorine and finally lecideine; juvenile ascospore locules lachrymiform..... **A. ropinii**
7: Apothecia lecideine throughout development; juvenile ascospore locules spherical or clavate..... 8

8 Subhymenium inspersed; juvenile ascospore locules spherical ..... **A. porulosa**
8: Subhymenium not inspersed; juvenile ascospore locules clavate .... **A. lignicola** var. **australis**

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Figure 1. *Amandinea ornata* (holotype in GZU). Scale = 1 mm.

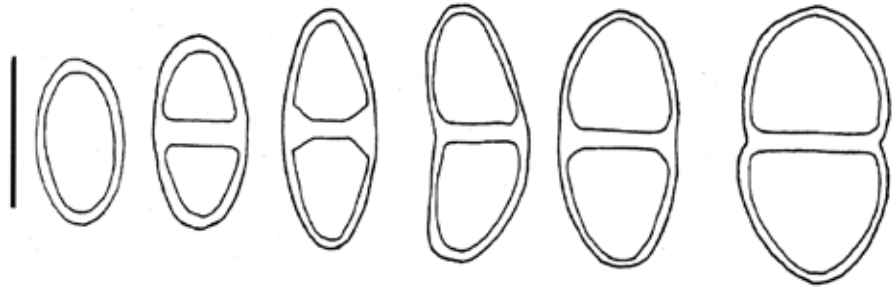

Figure 2. Ascospore ontogeny of *A. ornata*. Scale = 10 μm.

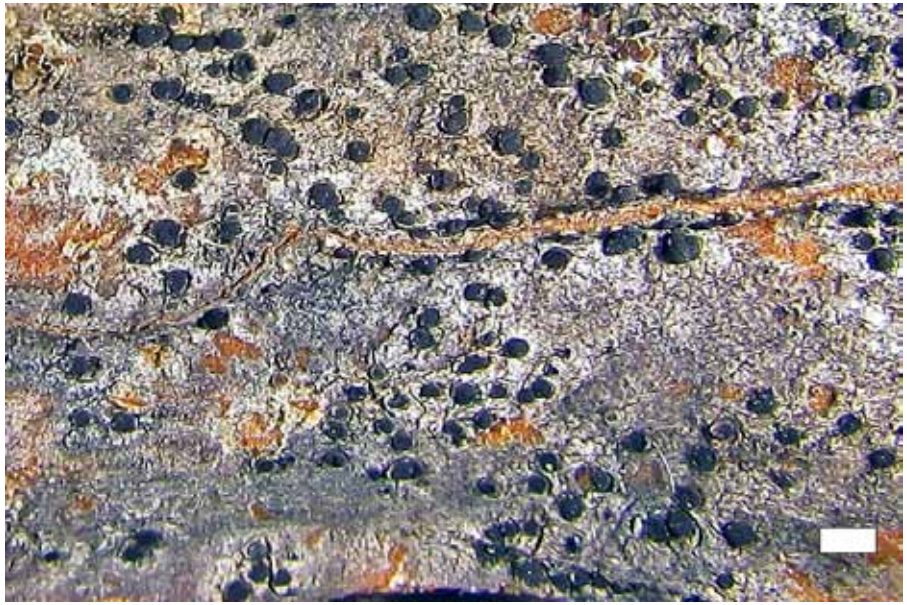

Figure 3. *Amandinea ropinii* (holotype in GZU). Scale = 1 mm.

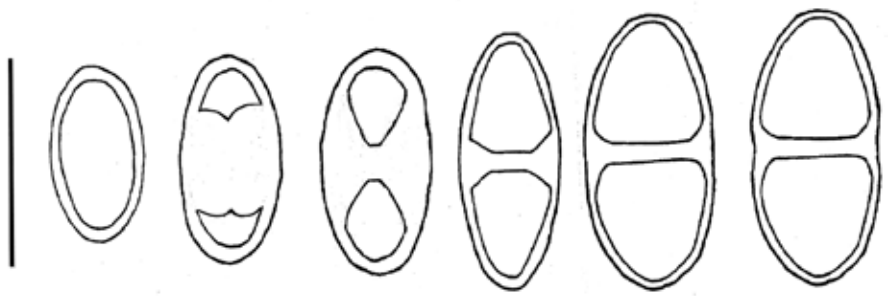

Figure 4. Ascospore ontogeny of *A. ropinii*. Scale = 10 μm.