

Five new saxicolous species of *Amandinea* (Ascomycota, Physciaceae) from New Zealand and southern Australia

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Abstract

Amandinea australasica Blaha, H.Mayrhofer & Elix, *A. brunneola* Elix & H.Mayrhofer, *A. julianeae* H.Mayrhofer & Elix, *A. variabilis* Elix, Blaha & H.Mayrhofer and *A. vitellina* Blaha, H.Mayrhofer & Elix are described as new to science. *Amandinea julianeae* has been found in New Zealand and Norfolk Island, but the other four new species also occur in southern Australia. The new combinations *Amandinea decedens* (Nyl.) Blaha, H.Mayrhofer & Elix, *A. litoralis* (Zahlbr.) Elix & H.Mayrhofer and *A. otagensis* (Zahlbr.) Blaha, H.Mayrhofer & Elix are made. *Amandinea litoralis*, together with the previously poorly understood *A. fuscostratula* (Zahlbr.) Elix and *A. nitrophila* (Zahlbr.) Elix, are re-circumscribed, and a key to the saxicolous species of *Amandinea* in New Zealand is provided.

In his revised second edition of the *Flora of New Zealand*, Galloway reported seven species of *Amandinea* (Galloway, 2007), four of which occur on rock. Since that time, *Amandinea fuscostratula* (Zahlbr.) Elix and *A. nitrophila* (Zahlbr.) Elix, previously listed under *Buellia*, have been added (Elix *et al.* 2015) and a new species, *A. austroconiops* Elix & Kantvilas, described (Elix & Kantvilas 2016). In this paper, we describe five new saxicolous species of *Amandinea*, all of which occur in New Zealand. Four of those species also occur in Tasmania, three in mainland Australia and two in Norfolk Island.

Methods

Observations and measurements of photobiont cells, thallus and apothecium anatomy, asci, ascospores and conidia 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 pre-treatment in K. Medullary sections were treated with 10% sulfuric acid (H₂SO₄), and apothecial sections with 50% nitric acid (N). Chemical constituents were identified by thin-layer chromatography (Elix 2014) and comparison with authentic samples.

The species

1. *Amandinea australasica* Blaha, H.Mayrhofer & Elix, sp. nov. MycoBank No. **MB 816942**

Figs 1, 2

Similar to *Amandinea punctata* (Hoffm.) Coppins & Scheid., but differs in having a better-developed thallus, longer conidia and smaller ascospores that exhibit weak medial wall-thickenings in early ontogeny (*Physconia*-type), and become constricted at the septum when mature.

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Five new saxicolous species of *Amandinea* (Ascomycota, Physciaceae) from New Zealand and southern Australia

Juliane Blaha, Helmut Mayrhofer & John A. Elix

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Type: New Zealand, North Island, Wellington, Te Rewarewa Point, Hongoeka Bay, NW of Plimmerton 41°04'S, 174°51'E, on coastal schist rocks, *H. Mayrhofer* 12292, *D. Glenny, W. Nelson, B. Polly & C. West*, 23.viii.1992 (holotype – GZU).

Thallus crustose, continuous, rimose to verrucose-areolate, to 40 mm wide and 0.2 mm thick; individual areoles irregular, angular, 0.1–0.4 mm wide; upper surface pale grey to grey-brown or pale brown, matt; prothallus marginal, white, brown or often not apparent; medulla white, lacking calcium oxalate (H₂SO₄-), I-; photobiont cells 8–18 µm diam. *Apothecia* 0.1–0.5(–0.8) mm wide, lecideine, immersed then mainly broadly adnate, more rarely sessile and constricted at the base, isolated or crowded, rounded or distorted by mutual pressure; disc black, epruinose, weakly concave then plane, eventually markedly convex; proper exciple thin, thick at first, excluded in older convex apothecia, in section the outer zone dark olive-brown to brown-black, K-, N-, 40–55 µm thick, the inner zone pale brown. *Epihymenium* 8–10 µm thick, brown to dark brown, K-, N-. *Hypothecium* dark brown to brown-black, 60–125 µm thick, K-. *Hymenium* 45–65 µm thick, colourless; subhymenium 25–55 µm thick, pale brown, not interspersed with oil droplets; paraphyses 1–1.5 µm wide, sparsely branched, with dark brown caps, the apices 4–6 µm wide; asci of the *Bacidia*-type, 8-spored. *Ascospores* *Physconia*-type when immature, *Buellia*-type when mature, brown, ellipsoid, 9–[11.4]–14 × 5–[6.1]–7 µm, constricted at the septum; outer spore-wall weakly 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: The species is named after its distribution.

Remarks

The new species is characterized by the crustose, areolate to verrucose-areolate, pale grey to grey-brown or pale brown thallus, the broadly adnate to sessile apothecia, the non-amyloid medulla, the small 1-septate, *Physconia*- then *Buellia*-type ascospores, curved, filiform conidia and the absence of lichen substances. *Amandinea australasica* resembles *A. punctata* in some respects, but that species has a thinner, less conspicuous thallus, larger *Buellia*-type ascospores, 10–[13.5]–20 × 5–[7.5]–9 µm, which do not become constricted at the septum, and it has shorter conidia, 14–20 µm long (Bungartz *et al.* 2007, Scheidegger 2009, Elix 2011). Morphologically, *A. australasica* can resemble *A. litoralis* (described below), but that species has larger ascospores, 12–[13.7]–17 × 6–[7]–9 µm, and usually a thicker thallus in which the areoles become aggregated and imbricate to form a bullate, warted, secondary squamulose crust.

Amandinea australasica is known from siliceous rocks in coastal regions of New Zealand, southern Australia (New South Wales, Victoria, Tasmania) and Norfolk Island. Associated species include *Amandinea decedens*, *A. pelidna* (Ach.) Fryday & L.Arcadia, *Buellia cranwelliae* Zahlbr., *Caloplaca cribrosa* (Hue) Zahlbr., *C. gallowayi* S.Y.Kondr., Kärnefelt & Filson, *Halecania subsquamosa* (Müll.Arg.) van den Boom & H.Mayrhofer, *Lecanora subcoarctata* (C.Knight) Hertel, *Pertusaria xanthoplaca* Müll.Arg., *Rinodina blastidiata* Matzer & H.Mayrhofer and *Jackelixia ligulata* (Körb.) S.Y.Kondr., Fedorenko, S.Stenroos, Kärnefelt & A.Thell.

SPECIMENS EXAMINED

Australia. *New South Wales:* • Near Melville Point, 13 km SSE of Batemans Bay, 35°50'S, 150°12'E, 2 m alt., on coastal rocks, *J.A. Elix* 26617A, 15.iii.1992 (CANB). *Victoria:* • Black Rock, beach on N side of Red Bluff, opposite Eliza Street, 37°57'51"S, 145°00'40"E, 2 m alt., on old asphalt rubble, *V. Stajsic* 6485, 18.viii.2012 (CANB, MEL). *Tasmania:* • Spiky Bridge, 42°11'S, 148°04'E, on dolerite rock outcrops in pasture near coast, *G. Kantvilas* 172/84b, 2.ii.1984 (HO); • Little Beach Coastal Reserve, SE of St. Marys, 41°37'30"S, 148°19'E, on coastal granite rocks, *H. Mayrhofer* 11218 *pr.p.* & *E. Hierzer*, 5.viii.1992 (GZU).

New Zealand. • South Island: • Nelson, Kaiteriteri, Stephens Bay, W of Nelson, 41°02'51"S, 173°01'04"E, 1–3 m alt., on coastal granite rocks, *J. Blaha* 0156, 4.iv.2001 (GZU); • Nelson, Dun Walkway, NZMS 260 O27:352897, 220 m alt., on rocks, *W. Malcolm* 2636A, 24.viii.1994 (CANB); • Canterbury, Banks Peninsula, Tumbledown Bay, S of Little River, 43°51'12"S, 172°46'01"E, 0–5 m alt., on coastal basalt rocks, *J. Blaha* 0093, 11.iii.2001 (GZU); • Canterbury, Banks Peninsula, Decanter Bay, NE of Duvauchelle, 43°39'35"S, 172°59'31"E, 0–3 m alt., on coastal basalt rocks, *J. Blaha* 0100, 13.iii.2001 (GZU); • Canterbury, Banks Peninsula, Otanerito Bay, 43°50'14"S, 172°03'28"E, 0–3 m alt., on coastal basalt rocks, *J. Blaha* 0105, 14.iii.2001 (GZU); • Otago, Black Head, S of Dunedin, 45°35'58"S, 170°25'37"E, 15 m alt., on coastal rocks, *J. Blaha* 0120, 0235, 22.iii.2001 (GZU); • Otago, Nuggets, Nugget Bay, S of Dunedin, 46°26'11"S, 169°47'46"E, 0–3 m alt., on coastal rocks, *J. Blaha* 0135, 22.iii.2001 (GZU); • Otago, Brighton, S of Dunedin, 45°56'48"S, 172°19'59"E, 0–3 m alt., on coastal sandstone rocks, *J. Blaha* 0229, 22.iii.2001 (GZU).

2. *Amandinea brunneola* Elix & H.Mayrhofer, sp. nov.
Mycobank No. **MB 816943**

Figs 3, 4

Similar to *Amandinea australasica*, but differs in having a thicker, darker brown thallus and broader *Buellia*-type ascospores that do not become constricted at the septum at maturity.

Type: Australia, Tasmania, Bicheno, 41°53'S, 147°18'E, 2 m alt., on granite rocks along the foreshore, *J.A. Elix* 5539, 13.i.1979 (holotype – CANB).

Thallus crustose, continuous, rimose-areolate to verrucose-areolate, to 70 mm wide and 0.4 mm thick; individual areoles irregular, angular, 0.2–1 mm wide; upper surface brown to dark brown, matt, smooth; prothallus marginal, black or not apparent; medulla white, lacking calcium oxalate (H₂SO₄-), I-; photobiont cells 7–18 µm diam. *Apothecia* 0.1–0.5(–0.6) mm wide, lecideine, immersed then mainly broadly adnate, more rarely sessile and constricted at the base, isolated or crowded, rounded or distorted by mutual pressure; disc black, epruinose, weakly concave then plane, eventually weakly convex; proper exciple persistent, tumid at first, then thinner in older apothecia, in section the outer zone dark brown, K-, N-, 40–60 µm thick, the inner zone paler brown. *Epihymenium* 10–12 µm thick, brown to dark brown, K-, N-. *Hypothecium* brown to dark brown, 100–130 µm thick, K-. *Hymenium* 45–60 µm thick, colourless, not interspersed with oil droplets; paraphyses 1–1.5 µm wide, sparsely branched, with apices 3.5–5 µm wide and brown caps; asci of the *Bacidia*-type, 8-spored. *Ascospores* *Physconia*-type when submature, then *Buellia*-type, brown, ellipsoid, 10–[11.3]–13 × 5–[6.8]–8 µm, not constricted at the septum; outer spore-wall finely ornamented. *Pycnidia* immersed, ostiole black; conidia filiform, curved, 15–25 × 0.7–1 µm. *Chemistry:* Thallus K-, P-, C-, UV-; no lichen substances detected.

Etymology: The species is named after the colour of the upper surface.

Remarks

The new species is characterized by the crustose, areolate to verrucose-areolate, brown thallus, the mainly broadly adnate apothecia with epruinose discs, the white non-amyloid medulla, the small, 1-septate, *Buellia*-type ascospores that are not constricted at the septum, curved, filiform conidia and the absence of lichen substances. *Amandinea brunneola* could be confused with *A. australasica* (described above), but the latter differs in having alternative ascospore development, the spores being *Physconia*-type in early ontogeny and constricted at the septum when mature. Morphologically, the species resembles *A. julianae* (described below), but that species differs in con-

taining an orange medullary pigment and in often having grey-white-pruinose discs. The ascospores of *A. brunneola* resemble those of *A. punctata*, but that has larger *Buellia*-type ascospores, 10–[13.5]–20 × 5–[7.5]–9 µm and a thinner, less conspicuous thallus (Bungartz *et al.* 2007, Scheidegger 2009, Elix 2011).

Amandinea brunneola is common on coastal siliceous rocks in Tasmania, but rare in the South Island of New Zealand. In Tasmania, associated species include *Amandinea decedens*, *A. pelidna* (Ach.) Fryday & L.Arcadia, *Catillaria australittoralis* Kantvilas & van den Boom, *C. gallowayi* S.Y.Kondr., Kärnefelt & Filson, *Halecania subsquamosa* (Müll. Arg.) van den Boom & H.Mayrhofer, *Pertusaria xanthoplaca* Müll.Arg., *Rinodina blastidiata* Matzer & H.Mayrhofer and *Jackelixia ligulata* (Körb.) S.Y.Kondr., Fedorenko, S.Stenroos, Kärnefelt & A.Thell.

SPECIMENS EXAMINED

Australia. Tasmania. • Type locality, on granite rocks along the foreshore, *J.A. Elix* 23979, 21.i.1990 (CANB); • Grants Point, 41°17'S, 148°20'E, 10 m alt., on granite rocks in coastal scrub, *G. Kantvilas* 208/01, 21.ii.2001 (HO); • Little Beach Coastal Reserve, SE of St. Marys, 41°37'30"S, 148°19'E, on coastal granite rocks, *H. Mayrhofer* 11218 *pr.p.* & *E. Hierzer*, 5.viii.1992 (GZU), *H. Mayrhofer* 11223 & *E. Hierzer*, 5.viii.1992 (GZU); • Bicheno, N of Rice Beach, near the Blowhole, 41°53'S, 148°18'E, on coastal granite rocks, *H. Mayrhofer* 11230, 11231 & *E. Hierzer*, 5.viii.1992 (GZU); • Freycinet Peninsula, between Coles Bay and Hazards Beach, SW of Lonny Creek, 42°09'S, 148°15'30"E, on coastal granite rocks, *H. Mayrhofer* 11239 & *E. Hierzer*, 5.viii.1992 (GZU); • Falmouth S of Scamander, Henderson Point, 41°30'S, 148°16'E, on coastal granite rocks, *H. Mayrhofer* 11202, 11212 *pr.p.*, 11213 *pr.p.*, 11214 *pr.p.* & *E. Hierzer*, 6.viii.1992 (GZU); • Cape Sorell, 42°12'S, 145°10'E, on rock, *J.E.S. Townrow* 71/1075, v.1977 (HO); • South West Island, Kents Group, Bass Strait, 39°31'S, 147°07'E, on low rock outcrops, *J.S. Whinray* 1754, 14.xii.1987 (HO, MEL).

New Zealand. • South Island, Otago, Black Head, S of Dunedin, 45°35'58"S, 170°25'37"E, 15 m alt., on coastal rocks, *J. Blaha* 0118, 22.iii.2001 (GZU).

3. *Amandinea fuscoatratura* (Zahlbr.) Elix, *Australas. Lichenol.* 77, 39 (2015) Figs 5, 6 MycoBank No.: **MB 812401**

Basionym: *Buellia fuscoatratura* Zahlbr., *Denkschr. Akad. Wiss. Wien math.-naturwiss. Kl.* 104, 374 (1941).

Type: New Zealand: Otago, Goat Island, near Dunedin, on coastal rocks, *J.S. Thomson* T 1044 (holotype: W!; isotypes CHR!, OTA).

Thallus crustose, to c. 35 mm wide and 0.5 mm thick, rimose-areolate; the individual areoles irregular, angular, 0.1–0.3 mm wide; upper surface pale to dark grey or grey-brown, matt; prothallus black, marginal, usually present; medulla white, H₂SO₄–, I–; photobiont cells 8–16 µm wide. *Apothecia* 0.2–0.8 mm wide, lecideine, immersed, but soon broadly adnate to sessile, dispersed or becoming crowded; disc black, epruinose, weakly concave to weakly convex; proper exciple distinct, thick, swollen, persistent, in section 45–55 µm thick, with the outer zone dark brown to brown-black, K–, paler brown within. *Epithymenium* 8–10 µm thick, brown to dark brown, K–, N–. *Hypothecium* 100–175 µm thick, brown to brown-black, K–, N–. *Hymenium* 45–75 µm thick, colourless, not inspersed; subhymenium 25–30 µm thick, pale brown, not inspersed; paraphyses 1.5–1.7 µm wide, simple to sparsely branched, with apices, 4–6 µm wide and brown caps; asci of the *Bacidia*-type, 8-spored. *Ascospores* initially of the *Physconia*-type, of the *Buellia*-type when mature, 1-septate, brown, ellipsoid, 11–[13.6]–16 × 5–[7.0]–10 µm, straight or rarely curved, becoming weakly constricted at the septum; outer spore-wall finely ornamented (microrugulate). *Pycnidia* common,

pyriform, immersed, black; conidia filiform, curved, 15–25 × 0.7–1 µm. *Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Remarks

This species is characterized by the crustose, rimose-areolate, pale to dark grey or grey-brown thallus, the initially immersed then broadly adnate to sessile apothecia, the non-amyloid medulla, non-inspersed subhymenium, 1-septate, *Physconia*- then *Buellia*-type ascospores, 11–16 × 5–10 µm, the curved, filiform conidia, 15–25 µm long, and the absence of lichen substances. It closely resembles *A. nitrophila* (described below), but that species has mainly immersed apothecia and larger ascospores that are not constricted and often slightly dilated at the septum. In addition, *A. nitrophila* differs in having an inspersed subhymenium and usually not having a prothallus.

SPECIMENS EXAMINED

Australia. Tasmania. • Courland Bay, 41°56'S, 148°19'E, 2 m alt., on coastal granite rocks, *G. Kantvilas* 457/02, 20.viii.2002 (HO).

New Zealand. South Island. • Canterbury, Goose Bay, S of Kaikoura, 42°27'29"S, 173°33'15"E, 0–5 m alt., on coastal greywacke rocks, *J. Blaha* 0202, 27.iv.2001 (GZU); • Nelson, Boulder Bank, NE of Nelson, 41°12'56"S, 173°19'43"E, 0–2 m alt., on coastal rocks, *J. Blaha* 0168, 6.iv.2001 (GZU); • Otago, Nuggets, Nugget Bay, S of Dunedin, 46°26'11"S, 169°47'46"E, 0–3 m alt., on coastal rocks, *J. Blaha* 0132, 0133, 0136, 22.iii.2001 (GZU).

4. *Amandinea julianae* H.Mayrhofer & Elix, sp. nov.

Figs 7, 8

MycoBank No. **MB 816944**

Similar to *Amandinea punctata*, but differs in having a better-developed thallus, smaller ascospores that exhibit weak medial thickenings in early ontogeny, longer conidia and in containing an unknown orange pigment in the medulla.

Type: New Zealand, North Island, Wellington, Te Humenga Point, Cape Palliser, 2 km N of Ngawi, SE of Wellington, 41°34'22"S, 175°13'30"E, 0–5 m alt., on coastal greywacke rocks, *J. Blaha* 0195, 24.iv.2001 (holotype – GZU; isotype – WELT).

Thallus crustose, continuous, rimose-areolate to verrucose-areolate, to 50 mm wide and 0.3 mm thick; individual areoles irregular, angular, 0.2–0.7 mm wide; upper surface pale grey to pale brown or orange-brown, matt, ±coarsely to finely granulose; prothallus marginal, white or not apparent; medulla white, with patches of yellow-orange pigment, K+ bright yellow, lacking calcium oxalate (H₂SO₄–), I–; photobiont cells 7–14 µm diam. *Apothecia* 0.1–0.5(–0.6) mm wide, lecideine, immersed then mainly broadly adnate, more rarely sessile and constricted at the base, isolated or crowded, rounded or distorted by mutual pressure; disc black, sparsely to moderately grey-white-pruinose, weakly concave then plane, eventually markedly convex; the proper exciple thin, weakly tumid at first, then indistinct or excluded in older convex apothecia, in section outer zone dark brown, K–, N–, 35–55 µm thick, the inner zone pale brown. *Epithymenium* 8–12 µm thick, brown to dark brown, K–, N–. *Hypothecium* pale brown to brown, 70–100 µm thick, K–. *Hymenium* 45–70 µm thick, colourless, not inspersed with oil droplets; paraphyses 1–1.5 µm wide, sparsely branched, with apices 3.5–4 µm wide and brown caps; asci of the *Bacidia*-type, 8-spored. *Ascospores* *Physconia*-type when immature, *Buellia*-type when mature, brown, ellipsoid, 10–[11.1]–13 × 5–[6.6]–8 µm, not constricted at the septum; outer spore-wall finely ornamented. *Pycnidia* immersed, ostiole black; conidia filiform, curved, 16–27 × 0.7–1 µm. *Chemistry*: Thallus K–, P–, C–, UV–; medulla patchily K+ bright yellow; no lichen substances detected.

Etymology: This species is named after the Austrian biologist Dr Juliane Blaha for her pioneering work on the saxicolous species of *Amandinea* in New Zealand.

Remarks

The new species is characterized by the crustose, areolate to verrucose-areolate, pale grey to pale brown or orange-brown thallus, the broadly adnate to sessile apothecia with pruinose discs, a medulla containing clumps of yellow-orange pigment, the small, 1-septate, *Physconia*- then *Buellia*-type ascospores that are not constricted at the septum, curved, filiform conidia and the absence of lichen substances. Morphologically, it closely resembles *A. australasica* (described above), but that species has a white medulla that lacks pigments, epruinose discs and ascospores that are constricted at the septum. *Amandinea julianeae* also resembles *A. punctata*, but the latter has larger, *Buellia*-type ascospores, 10–[13.5]–20 × 5–[7.5]–9 µm, that do not exhibit any medial wall thickenings throughout spore ontogeny, and shorter conidia, 14–20 µm long (Bungartz *et al.* 2007, Scheidegger 2009, Elix 2011). The same medullary pigment present in *A. julianeae* also occurs in *A. vitellina* (see below). However, *A. vitellina* differs in having a rudimentary, ecorticate, granulose thallus and *Buellia*-type ascospores that lack wall-thickenings.

Amandinea julianeae is rare in coastal regions of New Zealand and Norfolk Island, where it occurs on siliceous rocks. Associated species include *Amandinea decedens*, *A. pelidna* (Ach.) Fryday & L.Arcadia, *Buellia cranwelliae* Zahlbr., *Caloplaca cribrosa* (Hue) Zahlbr., *C. gallowayi* S.Y.Kondr., Kärnefelt & Filson, *Halecania subsquamosa* (Müll.Arg.) van den Boom & H.Mayrhofer, *Lecanora subcoarctata* (C.Knight) Hertel, *Pertusaria xanthoplaca* Müll.Arg., *Rinodina blastidiata* Matzer & H.Mayrhofer and *Jackelixa ligulata* (Körb.) S.Y.Kondr., Fedorenko, S.Stenroos, Kärnefelt & A.Thell.

SPECIMENS EXAMINED

New Zealand. North Island. • Wellington, Cape Palliser Road, c. 13 km N of Ngawihi, 41°29'S, 175°13'E, on rock outcrops near the sea, *H. Mayrhofer* 10879 & *E. Hierzer*, 18.viii.1992 (GZU); South Island. • Canterbury, Banks Peninsula, Rapaki Bay, SW of Lyttelton, 43°36'25"S, 172°40'55"E, 1–3 m alt., on coastal basalt rocks, *J. Blaha* 0110, 16.iii.2001 (GZU).

Norfolk Island. • Cascade Creek, Cascade Reserve, 29°01'20"S, 167°57'50"E, 20 m alt., on volcanic rock in grazed grassland, *J.A. Elix* 27441, 15.vi.1992 (CANB); • Duncombe Bay, 29°00'S, 167°55'30"E, 50 m alt., on top of flat boulder on cliffs with grasses and low shrubs, *H. Streimann* 34746, 9.xii.1984 (CANB).

5. *Amandinea litoralis* (Zahlbr.) H.Mayrhofer & Elix, comb. nov. Figs 9, 10
MycoBank No. **MB 816947**

Basionym: *Buellia litoralis* Zahlbr., *Denkschr. Akad. Wiss. Wien math.-naturwiss. Kl.* **104**, 375 (1941).

Type: New Zealand: Otago, Black Head, on coastal rocks, *J.S. Thomson* T 397 (holotype – W!; isotype – CHR).

Thallus crustose, continuous, rimose to verrucose-areolate, to 40 mm wide and 0.5 mm thick; individual areoles irregular, angular, 0.2–0.5(–1.2) mm wide, sometimes becoming aggregated and imbricate to form a secondary bullate, warted or subsquamulose crust; upper surface pale grey to grey-brown, matt; prothallus not apparent; medulla white, lacking calcium oxalate (H₂SO₄–), I–; photobiont cells 7–16 µm diam. *Apothecia* 0.3–1.5 mm wide, lecideine, immersed then mainly broadly adnate, more rarely sessile and constricted at the base, isolated or crowded, rounded, rarely becoming tuberculate; disc black, epruinose, weakly concave then plane, eventually markedly

convex; proper exciple thin, tumid at first, excluded in older convex apothecia, in section the outer zone brown-black, K–, N–, 25–35 µm thick, the inner zone pale brown to colourless, 35–45 µm thick. *Epilhymenium* 10–14 µm thick, brown to dark brown, K–, N–. *Hypothecium* deep reddish brown, 120–200 µm thick, K–. *Hymenium* 60–80 µm thick, colourless; subhymenium 50–75 µm thick, colourless to pale brown, not interspersed with oil droplets; paraphyses 1–1.5 µm wide, sparsely branched, with apices 4–5 µm wide and brown caps; asci of the *Bacidia*-type, with 8 or fewer spores. *Ascospores* *Physconia*-type when immature, *Buellia*-type when mature, brown, ellipsoid, 12–[13.7]–17 × 6–[7.0]–9 µm, ±curved, older spores constricted at the septum; outer spore-wall weakly ornamented. *Pycnidia* immersed, ostiole black; conidia filiform, curved, 16–27 × 0.7–1 µm.

Chemistry: Thallus K–, P–, C–, UV–; no lichen substances detected.

Remarks

The species is characterized by the crustose, markedly verrucose and areolate to distinctly warted or subsquamulose, pale grey to grey-brown thallus, the broadly adnate to sessile apothecia, the non-amyloid medulla, the broad colourless, inner zone of the excipulum, 1-septate, *Physconia*- then *Buellia*-type ascospores, 12–17 × 6–9 µm, curved, filiform conidia, 16–27 µm long, and the absence of lichen substances. Morphologically, it can resemble depauperate specimens of *A. conioops* (Wahlenb.) M.Choisy ex Scheid. & H.Mayrhofer, but that species has larger ascospores, 12–[16.5]–22 × 7–[8.5]–11 µm, and usually a much better-developed thallus that often becomes short-lobed, or where the areoles become aggregated and imbricate to form a bullate, warted, secondary squamulose crust. In addition, the excipulum of *A. conioops* lacks a broad, colourless inner zone (Elix & Kantvilas 2016).

Amandinea litoralis is known from rock, more particularly siliceous rock, in coastal regions of New Zealand, Tasmania and Norfolk Island. Associated species include *Amandinea decedens*, *A. pelidna* (Ach.) Fryday & L.Arcadia, *Buellia cranwelliae* Zahlbr., *Caloplaca cribrosa* (Hue) Zahlbr., *C. gallowayi* S.Y.Kondr., Kärnefelt & Filson, *Halecania subsquamosa* (Müll.Arg.) van den Boom & H.Mayrhofer, *Lecanora subcoarctata* (C.Knight) Hertel, *Pertusaria xanthoplaca* Müll.Arg., *Rinodina peloleuca* (Nyl.) Müll.Arg., *Tylothallia verrucosa* (Müll.Arg.) Kantvilas and *Jackelixa ligulata* (Körb.) S.Y.Kondr., Fedorenko, S.Stenroos, Kärnefelt & A.Thell.

SPECIMENS EXAMINED

Australia. Tasmania. • Bellerive Bluff, below the battery, 42°53'S, 147°22'E, 2 m alt., on mudstone cliff-face at the shore line, *G. Kantvilas* 484/01, 3.vii.2001 (HO); • Saddle between Mt Amos and Mt Mayson, at old Wineglass Bay Lookout, 42°09'S, 148°17'E, 210 m alt., on granite boulders in dry sclerophyll forest, *G. Kantvilas* 193/05, 19.vii.2005 (HO).

New Zealand. North Island. • Coromandel Peninsula, NW of Colville, between Waiaro and Port Jackson, 36°30'55"S, 175°19'40"E, 0–3 m alt., on coastal rocks, *J. Blaha* 0191, 0192, 16.iv.2001 (GZU); • Wellington, Te Humenga Point, Cape Palliser, 2 km N of Ngawi, 41°34'22"S, 175°13'30"E, 0–5 m alt., on coastal greywacke rocks, *J. Blaha* 0196, 24.iv.2001 (GZU); • Wellington, Island Bay, S of Wellington, 41°21'S, 174°46'E, on coastal rocks, *H. Mayrhofer* 10883, 22.viii.1992 (GZU). South Island. • Marlborough, Tom Canes Bay, NE of Kaikoura, coast road to Blenheim, 41°19'07"S, 174°06'28"E, 0–3 m alt., on coastal schist rocks, *J. Blaha* 0177, 10.iv.2001 (GZU); • Marlborough, Robin Hood Bay, SE of Picton, 41°21'17"S, 174°04'37"E, c. 1–3 m, on coastal schist rocks, *J. Blaha* 0179, 10.iv.2001 (GZU); • Nelson, Okiwi Bay, Marlborough Sounds, NE of Nelson, 41°06'39"S, 173°36'49"E, 1–3 m alt., on coastal rocks, *J. Blaha* 0169, 0172, 7.iv.2001 (GZU); • Nelson, Cable Bay, 17 km NE of Nelson, 41°09'S, 173°24'E, 60 m alt., on weathered rock in pasture, *J.A. Elix* 33451, 1.ii.1993 (CANB); • Nelson, Tantragee Saddle, NZMS 260 O27:358903, 41°18'S, 173°19'E, 180 m alt., on rock, *W. Malcolm* 1917, 8.v.1994 (CANB); • Nelson, Pepin Island, Cable Bay, NE of Nelson, 41°09'S,

173°25'E, on coastal rocks, *H. Mayrhofer* 10761, 29.viii.1992 (GZU); • Nelson, Ataata Point, Cable Bay, NE of Nelson, 41°09'38"S, 173°24'48"E, 0–7 m alt., on coastal granite rocks, *H. Mayrhofer* 10738, 25.viii.1992; • *loc. id.*, *J. Blaha* 0213, 6.iv.2001 (GZU); • Nelson, Patons Rock, Golden Bay, NW of Takaka, 40°47'S, 172°43'E, on coastal rocks, *H. Mayrhofer* 13143, 13153, N. & W. Malcolm, 25.viii.1992 (GZU); • Nelson, Kaiteriteri, N of Motueka, 41°02'S, 173°01'E, on coastal granite rocks, *H. Mayrhofer* 12314, N. & W. Malcolm, 27.viii.1992 (GZU); • Canterbury, Banks Peninsula, Decanter Bay, NE of Duvauchelle, 43°39'35"S, 172°59'31"E, 0–3 m alt., on coastal basalt rocks, *J. Blaha* 0099, 13.iii.2001 (GZU); • Canterbury, Banks Peninsula, Hickory Bay, 43°46'45"S, 172°05'48"E, 0–5 m alt., on coastal basalt rocks, *J. Blaha* 0109, 15.iii.2001 (GZU); • Otago, Brighton, S of Dunedin, 45°56'48"S, 172°19'59"E, 0–3 m alt., on coastal sandstone rocks, *J. Blaha* 0122, 22.iii.2001 (GZU).
Norfolk Island. • Philip Island, Upper Long Valley, 29°07'30"S, 167°57'E, 40 m alt., on volcanic rocks in the open, *J.A. Elix* 18480 *pr.p.* & *H. Streimann*, 4.xii.1984 (CANB).

6. *Amandinea nitrophila* (Zahlbr.) Elix, *Australas. Lichenol.* 77, 40 (2015) Figs 11, 12
Mycobank No. **MB 812402**

Basionym: *Buellia nitrophila* Zahlbr., *Denkschr. Akad. Wiss. Wien math.-naturwiss. Kl.* 104, 372 (1941)

Type: New Zealand: Otago, Black Head, Dunedin, on coastal rocks, *J.S. Thomson* T394 (A84) (holotype W!; isotype CHR!).

Thallus crustose, to c. 45 mm wide and 1 mm thick, rimose-areolate to verrucose-areolate; individual areoles irregular, angular, 0.3–1 mm wide; upper surface grey-white to grey-brown or brown, matt, smooth; prothallus black, marginal, but usually not apparent; medulla white, H₂SO₄–, I–; photobiont cells 10–16 µm wide. *Apothecia* 0.2–0.6 mm wide, lecideine, mainly immersed, rarely becoming adnate, dispersed or rarely crowded; disc black, epruinose, weakly concave to plane; proper exciple distinct, thin, persistent, in section 30–50 µm thick, with the outer zone brown-black, K–, paler brown within. *Epithymenium* 10–12 µm thick, brown to dark brown, K–, N–. *Hypothecium* 100–160 µm thick, brown to brown-black, K–, N–. *Hymenium* 75–100 µm thick, colourless, not interspersed; subhymenium 25–50 µm thick, pale brown, interspersed with oil droplets; paraphyses 1.5–1.7 µm wide, simple to sparsely branched, with apices 4–6 µm wide and brown caps; asci of the *Bacidia*-type, 8-spored. *Ascospores* initially of the *Physconia*-type, of the *Buellia*-type when mature, 1-septate, brown, ellipsoid, 12–[16.3]–20 × 7–[8.7]–12 µm, not constricted and often dilated at the septum; outer spore-wall finely ornamented (microrugulate). *Pycnidia* common, pyriform, immersed, brown to black; conidia filiform, curved, 12–27 × 0.7–1 µm. *Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Remarks

The species is characterized by the crustose, rimose- to verrucose-areolate, grey-white to grey-brown or brown thallus, the broadly immersed to adnate apothecia, the non-amyloid medulla, interspersed subhymenium, 1-septate, *Physconia*- then *Buellia*-type ascospores, 12–20 × 7–12 µm, the curved, filiform conidia, 12–27 µm long, and the absence of lichen substances. *Amandinea coniops* has similar-sized ascospores, but they are commonly constricted at the septum (non-constricted or dilated at the septum in *A. nitrophila*). *Amandinea coniops* also differs in having larger apothecia (to 1 mm wide), a non-interspersed subhymenium and usually a much better-developed thallus that often becomes shortly lobed at the margins or where the areoles become aggregated and imbricate to form a bullate, warted, secondary subsquamulose crust (Elix & Kantvilas 2016).

Amandinea nitrophila is known from rock, especially siliceous rock, in coastal regions of New Zealand and southern South America, and on Heard Island in the Southern Indian ocean. In New Zealand, associated species include *Amandinea decedens*, *A. pelidna* (Ach.) Fryday & L.Arcadia, *A. otagensis*, *Buellia cranwelliae* Zahlbr., *Caloplaca scribrosa* (Hue) Zahlbr., *C. gallowayi* S.Y.Kondr., Kärnefelt & Filson, *Halecania subsquamosa* (Müll.Arg.) van den Boom & H.Mayrhofer, *Lecanora subcoarctata* (C.Knight) Hertel, *Pertusaria xanthoplaca* Müll.Arg., *Rinodina blastidiata* Matzer & H.Mayrhofer, *R. peloleuca* (Nyl.) Müll.Arg. and *Jackelia ligulata* (Körb.) S.Y.Kondr., Fedorenko, S. Stenroos, Kärnefelt & A.Thell.

SPECIMENS EXAMINED

Argentina. • Tierra del Fuego, Dept. Ushuaia, Parque Nacional de Tierra del Fuego, tip of Bahía Lapataia, 0–5 m, on coastal rocks, *J. Poelt*, 13.i.1989 (GZU).

Australia. • Heard & McDonald Islands, Heard Island, Atlas Cove, 53°02'S, 73°25'E, on wind-blasted coastal rocks, leeward side, NE aspect, *A. McGregor* 25 *pr.p.*, 20.ii.1983 (CANB).

Chile. • Chiloé, N coast, road W of Ancud to Quetalmahue, beach between Lechagua and Ancud, sea level, on coastal rocks, *M. Matzer & B. Pelzmann*, 22.xi.1994 (GZU); • Patagonia, XII Region (Magellanes), Straits of Magellan, Fuerte Bulnes, c. 50 km S of Punta Arenas, 53°36'S, 70°56'W, sea level, on coastal rocks, *M. Matzer & B. Pelzmann*, 13.xii.1994 (GZU).

New Zealand. North Island. • Wellington, Manurewa Point W of Toara, S of Martinborough, 41°30'S, 175°32'E, on coastal rocks, *H. Mayrhofer* 132881 & *E. Hierzer*, 19.viii.1992 (GZU). South Island. • Otago, Otago Peninsula, Allans Beach, 45°52'24"S, 170°41'56"E, 0–5 m alt., on coastal basalt rocks, *J. Blaha* 0240, 21.iii.2001 (GZU); • Otago, Crystal Beach, S of Dunedin, E of Milton, 46°11'55"S, 170°05'04"E, 0–3 m alt., on coastal sandstone rocks, *J. Blaha* 0128, 0225, 22.iii.2001 (GZU); • Southland, Curio Bay, Waikawa, E of Invercargill, 46°39'41"S, 169°06'18"E, 1–3 m alt., on coastal sandstone rocks, *J. Blaha* 0142, 23.iii.2001 (GZU); • Southland, Pahia Point, E of Riverton, 46°18'28"S, 167°41'55"E, 1–3 m alt., on coastal basalt rocks, *J. Blaha* 0144, 25.iii.2001 (GZU); • Southland, Cosy Nook, E of Riverton, 46°19'54"S, 167°42'46"E, 1–3 m alt., on coastal rocks, *J. Blaha* 0146, 0215, 25.iii.2001 (GZU); • Southland, Kawakaputa Bay, E of Riverton, 46°22'47"S, 167°48'23"E, 1–3 m alt., on coastal basalt rocks, *J. Blaha* 0146, 25.iii.2001 (GZU).

7. *Amandinea variabilis* Elix, Blaha & H.Mayrhofer, sp. nov. Figs 13, 14
Mycobank No. **MB 816945**

Similar to *Amandinea pelidna*, but differs in having larger ascospores and a subhymenium interspersed with oil droplets.

Type: New Zealand, North Island, Wellington, Titahi Bay, N of Porirua, 41°07'S, 174°50'E, on coastal rocks, *H. Mayrhofer* 12264 D. *Glenny*, *W. Nelson*, *B. Polly* & *C. West*, 23.viii.1992 (holotype – GZU; isotype – WELT).

Thallus crustose, forming extended patches to c. 60 mm wide, epilithic, white to grey-white or pale brown, to 0.6 mm thick, rimose then rimose-areolate to verrucose-areolate and warty, individual areoles 0.2–1 mm wide; prothallus dark grey, black or often not apparent; medulla white, lacking calcium oxalate (H₂SO₄–), I–; photobiont cells 7–14 µm wide. *Apothecia* 0.1–0.9(–1.2) mm wide, lecideine, immersed then broadly adnate or becoming sessile and constricted at the base, scattered or crowded, rounded or irregular through mutual pressure; disc black, epruinose, weakly concave to plane or weakly convex; proper excipulum distinct, tumid, persistent, often slightly higher than disc, in section 40–60 µm thick, the outer zone dark brown to black-brown, K–, paler brown within. *Epithymenium* 10–15 µm thick, dark olive-brown, K–, N–. *Hypothecium* 150–250 µm thick, dark brown to brown-black, K–, N+ orange-

brown. *Hymenium* 50–75 µm thick, colourless; subhymenium 30–50 µm thick, pale brown, densely inspersed with oil droplets; paraphyses 1.5–1.8 µm wide, simple to sparsely branched, apices 3.5–5 µm wide with dark brown caps; asci of the *Bacidia*-type, 8-spored. *Ascospores* at first of the *Orcularia*-type, later of the *Physconia*-type, 1-septate, pale olive-green to brown, ellipsoid, (11–)13–16.0–18(–20) × 6–8.7–12 µm, not constricted and often swollen at the septum; outer spore-wall weakly ornamented. *Pycnidia* common, pyriform, superficial, black; conidia filiform, curved, 15–27 × 0.7–1 µm.

Chemistry: Thallus K–, C–, P–, UV–; no lichen substances detected or the yellow-green pigment, SV-1 present. This substance is a common accessory pigment in lichens (Culberson 1972).

Etymology: The specific epithet refers to the variable ascospore-type during ontogeny.

Remarks

The new species is most likely to be confused with *A. otagensis* and *A. pelidna*, in that all three species have *Orcularia*-type ascospores in the early stages of their development, grow in similar coastal habitats, have similar thalli, numerous pycnidia and lack lichen substances. However, both *A. pelidna* and *A. otagensis* (Zahlbr.) Blaha, H. Mayrhofer & Elix lack oil droplets in the subhymenium. In addition, the ascospores of *A. pelidna* are smaller, 10–[13.5]–16 × 6–[7.3]–19 µm, and do not become dilated at the septum (Blaha 2002, Galloway 2007). *Amandinea otagensis* differs from *A. variabilis* in having mainly immersed apothecia and somewhat shorter ascospores, 12–14.1–16(–17) µm long (Blaha 2002, Galloway 2007). Although *A. conglomerata* Elix & Kantvilas has an inspersed hymenium, it differs in having numerous, sessile apothecia that become convex and tuberculate with age, forming clusters of satellite discs when old, and by the much smaller *Buellia*-type ascospores, 10–[13.1]–15 × 5–[5.8]–7 µm that are often constricted at the septum (Elix & Kantvilas 2013). *Amandinea conglomerata* also differs in having a very reduced, inapparent thallus, whereas that of *A. variabilis* is usually well-developed and continuous.

Amandinea variabilis is a coastal species known from New Zealand, Victoria and Tasmania, where it is associated with typical littoral species such as *Amandinea decedens*, *A. pelidna*, *Buellia cranwelliae* Zahlbr., *Caloplaca cribrosa* (Hue) Zahlbr., *C. gallowayi* S.Y.Kondr., Kärnefelt & Filson, *Halecania subsquamosa* (Müll.Arg.) van den Boom & H. Mayrhofer, *Lecanora subcoarctata* (C.Knight) Hertel, *Pertusaria xanthoplaca* Müll.Arg., *Rinodina blastidiata* Matzer & H. Mayrhofer, *R. peloleuca* (Nyl.) Müll.Arg., *Tylothallia verrucosa* (Müll.Arg.) Kantvilas and *Jackelxia ligulata* (Körb.) S.Y.Kondr., Fedorenko, S. Stenroos, Kärnefelt & A. Thell.

SPECIMENS EXAMINED

Australia. **Victoria:** • Merricks Beach, 13 km SW of Hastings, 38°24'06"S, 145°06'E, 2 m alt., on coastal rocks behind beach, *G. Rambold* 5587, 13.iv.1986 (CANB). **Tasmania:** • Lucas Point, Fishermans Haul, 43°02'S, 147°20'E, 1 m alt., in shaded niche on coastal dolerite, *G. Kantvilas* 410/13, 8.xii.2013 (CANB, HO); • Trial Harbour, 41°56'S, 145°10'E, 2 m alt., on coastal serpentine boulders and outcrops, *G. Kantvilas* 416/14, 417/14, 19.ix.2014 (CANB, HO); • Little Beach Coastal Reserve, SE of St. Marys, 41°37'30"S, 148°19'E, on coastal granite rocks, *H. Mayrhofer* 11218 *pr.p.* & *E. Hierzer*, 5.viii.1992 (GZU); N side of creek, c. 0.7 km SW of Marrawah, 40°55'S, 144°42'E, on rock outcrop, *J.S. Whinray*, 1969 (HO, MEL).

New Zealand. **North Island.** • Wellington, Waser Bay, Mirimar Peninsula E of Wellington, 41°19'S, 174°49'E, on coastal rocks, *H. Mayrhofer* 12232, 12233, 12237, 12243, 12244, *D. Glennie*, *W. Nelson*, *B. Polly* & *C. West*, 22.viii.1992 (GZU); • type locality, on coastal rocks, *H. Mayrhofer* 12259, 12266, 12269, *D. Glennie*, *W. Nelson*, *B. Polly* & *C. West*, 23.viii.1992 (GZU); *loc. id.*, *J. Blaha* 0188, 14.iv.2001 (GZU). South

Island. • 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* 10722, *N. & W. Malcolm* & *B. Polly*, 25.viii.1992 (CANB); • Nelson, Golden Bay, Wainui Bay NE of Pohara, 40°47'S, 172°43'E, on coastal granite rocks, *H. Mayrhofer* 10786, 28.viii.1992 (GZU); • Canterbury, Banks Peninsula, Tumbledown Bay, S of Little River, 43°51'12"S, 172°46'01"E, 0–2 m alt., on coastal basalt rocks, *M. Lambauer* 0150, 4.xi.2003 (GZU); • Otago, Black Head, S of Dunedin, 45°35'58"S, 170°25'37"E, 15 m alt., on coastal rocks, *J. Blaha* 0121, 0234, 22.iii.2001 (GZU); • Otago, Otago Peninsula, Allans Beach, 45°52'24"S, 170°41'56"E, 0–5 m alt., on coastal basalt rocks, *J. Blaha* 0115, 21.iii.2001 (GZU); • Otago, Catlins, Cathedral Cove, S of Owaka, 46°35'35"S, 169°21'59"E, 1–3 m alt., on coastal sandstone rocks, *J. Blaha* 0138, 23.iii.2001 (GZU); • Southland, Curio Bay, Waikawa, E of Invercargill, 46°39'41"S, 169°06'18"E, 1–3 m alt., on coastal sandstone rocks, *J. Blaha* 0222, 23.iii.2001 (GZU); • Southland, Ocean Beach, Bluff, S of Invercargill, 46°35'36"S, 168°18'39"E, 1–3 m alt., on coastal basalt rocks, *J. Blaha* 0154, 26.iii.2001 (GZU).

8. *Amandinea vitellina* Blaha, Elix & H. Mayrhofer, sp. nov.

Figs 15, 16

Mycobank No. **MB 816946**

Similar to *Amandinea punctata* (Hoffm.) Coppins & Scheid., but differs in having smaller ascospores and longer conidia, and in containing an unknown orange pigment in the medulla.

Type: Australia, New South Wales, near Melville Point, 13 km SSE of Batemans Bay, 35°50'S, 150°12'E, 2 m alt., on coastal rocks, *J.A. Elix* 26617, 15.iii.1992 (holotype – CANB).

Thallus crustose or absent, discontinuous, verruculose or finely granulose, to 35 mm wide and 0.1 mm thick; individual verrucules-granules irregular, fleck-like, 0.05–0.3 mm wide; upper surface pale grey to white or pale orange, matt, ecorticate; prothallus not apparent; medulla white, with patches of orange pigment (insoluble in acetone), K+ bright yellow, lacking calcium oxalate (H₂SO₄–), I–; photobiont cells 7–15 µm diam. **Apothecia** 0.1–0.5(–0.6) mm wide, lecideine, mainly broadly adnate, more rarely sessile and constricted at the base, isolated, rounded or rarely crowded and distorted; disc black, epruinose, weakly concave then plane, eventually markedly convex; proper exciple persistent, thick at first, then thinner or excluded in older apothecia, in section the outer zone dark brown, 40–50 µm thick, K–, N–, the inner zone paler brown. **Epithymenium** 8–12 µm thick, brown to dark olive-brown, K–, N–. **Hypothecium** deep red-brown to brown-black, 100–160 µm thick, K–. **Hymenium** 45–60 µm thick, colourless, not inspersed with oil droplets; paraphyses 1–1.5 µm wide, sparsely branched, with apices 3–5 µm wide and dark brown caps; asci of the *Bacidia*-type, 8-spored. **Ascospores** *Physconia*-type when submature, then *Buellia*-type, brown, ellipsoid, 10–[11.7]–13 × 5–[6.5]–8 µm, not constricted at the septum; outer spore-wall weakly ornamented. **Pycnidia** immersed, ostiole black; conidia filiform, curved, 15–25 × 0.7–1 µm.

Chemistry: Thallus K–, P–, C–, UV–; medulla patchily K+ bright yellow; no lichen substances detected.

Etymology: The species is named after the pigmentation of the medulla.

Remarks

The new species is characterized by the crustose, discontinuous, verruculose to finely granulose, pale grey to white or pale orange, ecorticate thallus, mainly broadly adnate apothecia with epruinose discs, a medulla containing clumps of orange pigment, the small 1-septate, *Physconia*- then *Buellia*-type ascospores that are not constricted at the septum, curved, filiform conidia and the absence of lichen substances.

Morphologically, it closely resembles *A. julianae* (see above), a species that contains the same medullary pigment but differs in having a thicker, more substantial, corticate thallus, pruinose discs and ascospores that are more markedly *Physconia*-type in early ontogeny. *Amandinea vitellina* also resembles *A. punctata*, but that species has larger, *Buellia*-type ascospores, 10–[13.5]–20 × 5–[7.5]–9 μm, lacks the orange medullary pigment and has shorter conidia, 14–20 μm long (Bungartz *et al.* 2007, Scheidegger 2009, Elix 2011).

Amandinea vitellina is known from siliceous rocks in coastal regions of southern New South Wales and the South Island of New Zealand. Associated species include *Amandinea conglomerata* Elix & Kantvilas, *Buellia aeruginosa* A.Nordin, Owe-Larsson & Elix, *B. cranwelliae* Zahlbr., *B. stellulata* (Taylor) Mudd var. *stellulata*, *Catillaria australitortalis* Kantvilas & van den Boom, *Diploicia canescens* subsp. *australasica* Elix & Lumbsch, *Halecania subsquamosa* (Müll.Arg.) van den Boom & H.Mayrhofer, *Lecanora subcoarctata* (C.Knight) Hertel, *Pertusaria xanthoplaca* Müll.Arg., *Rinodina fertilis* (Körb.) Elix var. *fertilis*, *R. fertilis* var. *hypostictica* Elix, *Tylothallia verrucosa* (Müll.Arg.) Kantvilas and *Jackelixia ligulata* (Körb.) S.Y.Kondr., Fedorenko, S.Stenroos, Kärnefelt & A.Thell.

SPECIMENS EXAMINED

Australia. *New South Wales*: • Glasshouse Rocks, 2 km S of Narooma, 36°13'39"S, 150°08'25"E, 1–5 m alt., on coastal shale rocks in the splash zone, *J.A. Elix 46106*, 9.ii.2016 (CANB); • Keating Rocks, c. 1.5 km N of Bermagui, 36°24'54"S, 150°03'55"E, 1–5 m alt., on coastal shale rocks above the splash zone, *J.A. Elix 46138*, 10.ii.2016 (CANB). *New Zealand. South Island*. • Marlborough, Tom Canes Bay, coast road to Blenheim, E of Picton, NE of Kaikoura, 41°19'07"S, 174°06'28"E, 0–3 m alt., on coastal schist rocks, *J. Blaha 0178*, 10.iv.2001 (GZU); • Marlborough, Robin Hood Bay, SE of Picton, 41°21'17"S, 174°04'37"E, 1–3 m alt., on coastal schist rocks, *J. Blaha 0210*, 10.iv.2001 (GZU).

New combinations

The following new combinations are necessary because Juliane Blaha's thesis (Blaha 2002) was not formally published.

Amandinea decedens (Zahlbr.) Blaha, H.Mayrhofer & Elix, comb. nov.
Mycobank No. **MB 816949**

Basionym: *Lecidea decedens* Nyl. in W.A. Leighton, *Bot. J. Linn. Soc.* **10**, 31 (1869).
Synonym: *Buellia decedens* (Nyl.) Müll.Arg., *Bull. Herb. Boissier* **2**, App. **1**, 71 (1894).
Type: New Zealand: Wellington, littoral rocks south side of Wellington Harbour, *W. Colenso 6543* (lectotype: BM; isolectotype H-NYL - here designated).

This species is characterized by a crustose, white to pale grey, rimose-areolate thallus, sometimes containing variolaric acid, often delimited by a marginal, black prothallus, scattered, broadly adnate to sessile, lecideine apothecia up to 0.9 mm wide, often with white- to grey-pruinose discs, a non-inspersed hymenium, 8-spored asci, brown, 1-septate, *Orcularia*- to *Physconia*-type spores with strong medial wall-thickenings, 17–23 × 10–14 μm, and curved, filiform conidia, 20–25 × 0.7–1 μm. Detailed descriptions are given in Blaha (2002) and Galloway (2007).

Amandinea otagensis (Zahlbr.) Blaha, H.Mayrhofer & Elix comb. nov.
Mycobank No. **MB 816948**

Basionym: *Buellia otagensis* Zahlbr., *Denkschr. Akad. Wiss. Wien math.-naturwiss. Kl.* **104**, 373 (1941)
Type: New Zealand: Otago, Otago Heads, on coastal rocks, *J.S. Thomson T 1013*, i.1934 (holotype: W; isotypes CHR!, OTA).

This species is characterized by a white to brownish grey, rimose to rimose-areolate thallus often delimited by a marginal, black prothallus, scattered, immersed apothecia up to 0.5 mm wide, a non-inspersed hymenium, 8-spored asci, brown, 1-septate, *Orcularia*- to *Physconia*-type spores with strong medial wall-thickenings, 14–17 × 6–9 μm, and curved, filiform conidia, 15–30 × 0.7–1 μm. Detailed descriptions are given in Blaha (2002) and Galloway (2007).

Key to saxicolous species of *Amandinea* in New Zealand

- 1 Ascospores with marked medial wall-thickenings, *Orcularia*- to *Physconia*-type **2**
- 1: Ascospores without medial wall-thickenings, or with weak medial wall-thickening during spore ontogeny, *Buellia*-type **5**
- 2 Apothecia to 1 mm diam., often pruinose **3**
- 2: Apothecia to 0.6 mm diam., not pruinose **4**
- 3 Ascospores 17–23 × 10–14 μm; subhymenium not inspersed; ±variolaric acid present **A. decedens**
- 3: Ascospores 11–20 × 6–12 μm; subhymenium inspersed; ±SV-1 present **A. variabilis**
- 4 Apothecia immersed; thallus cream-coloured to pale brown white to brownish grey, rimose to rimose-areolate; ascospores 6–9 μm wide **A. otagensis**
- 4: Apothecia broadly adnate; thallus dirty white to grey-brown, rimose-areolate; ascospores 6–8 μm wide **A. pelidna**
- 5 On coastal and lowland rocks **6**
- 5: On montane rocks **16**
- 6 Ascospores without medial wall-thickenings; thallus grey to grey-brown, thin; apothecia to 0.75 mm wide, broadly adnate; ascospores *Buellia*-type, 12–15 × 7–9 μm; conidia to 20 μm **A. punctata**
- 6: Ascospores with weak medial wall-thickening during spore ontogeny, but quickly reduced **7**
- 7 Ascospores 15–30 × 7–16 μm **8**
- 7: Ascospores 9–17 × 5–10 μm **11**
- 8 Medulla I+ blue; ascospores 15–[19.6]–26 × 8–[11.2]–14 μm. **A. austroconiops**
- 8: Medulla I– **9**
- 9 Ascospores often curved, 18–[23]–30 × 10–[13]–16 μm; spore-wall rugulate **A. subbadioatra**
- 9: Ascospores not curved, 15–20 × 7–10 μm; spore-wall microrugulate **10**
- 10 Mature ascospores constricted; thallus thick, ±sublobate at the margins; subhymenium not inspersed; apothecia to 1 mm wide **A. coniops**
- 10: Mature ascospores not constricted; thallus thin, rimose-areolate; subhymenium inspersed; apothecia to 0.6 mm wide **A. nitrophila**
- 11 Ascospores 11–17 × 5–10 μm **12**
- 11: Ascospores 9–14 × 5–8 μm **13**
- 12 Mature ascospores often constricted; thallus thick, warty; prothallus absent; apothecia to 1.5 mm wide **A. litoralis**

- 12: Mature ascospores not or very rarely constricted; thallus thin, rimose-areolate; prothallus often black and prominent; apothecia to 0.8 mm wide
..... **A. fuscoatratura**
- 13 Ascospores constricted; disc epruinose; thallus lacking orange pigment.....
..... **A. australasica**
- 13: Ascospores not constricted; disc \pm pruinose; thallus with or without orange pigment.....**14**
- 14 Thallus absent or discontinuous, verruculose to granulose, white to pale orange; prothallus absent; thallus containing orange pigment **A. vitellina**
- 14: Thallus rimose-areolate, continuous, grey to brown or dark brown; prothallus often present; thallus \pm containing orange pigment.....**15**
- 15 Thallus brown or dark brown; prothallus often dark and prominent; disc epruinose; thallus lacking orange pigment **A. brunneola**
- 15: Thallus white to pale grey; prothallus grey-white or not apparent; disc often grey-white-pruinose; thallus containing orange pigment **A. julianeae**
- 16 Medulla I+ blue; ascospores 15–27 \times 8–14 μ m **A. austroconiops**
- 16: Medulla I–**17**
- 17 Ascospores often curved, 18–30 \times 10–16 μ m; spore-wall rugulate; thallus rimose-areolate.....**A. subbadioatra**
- 17: Ascospores not curved, 14–20 \times 7–10 μ m; spore-wall microrugulate; thallus of congested verrucules **A. isabellina**

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References

- Blaha, J (2002): *Taxonomische Studien an saxicolen Arten die Flechtengattung Amandinea (lichenisierte Ascomyceten, Physciaceae) von Neuseeland*. Diplomarbeit. Institut für Botanik der Karl-Franzens-Universität Graz, Graz, pp. 1–78.
- Bungartz, F; Nordin, A; Grube, U (2007): *Buellia*. In *Lichen Flora of the Greater Sonoran Desert Region* (Nash, TH; Gries, C; Bungartz, F; eds) Lichens Unlimited, Tempe. pp. 113–179.
- Culberson, CF (1972): Improved conditions and new data for the identification of lichen products by a standardized thin-layer chromatographic method. *Journal of Chromatography* **72**, 113–125.
- Elix, JA (2011): *Australian Physciaceae (Lichenised Ascomycota)*. Australian Biological Resources Study, Canberra. Version 18 October 2011. <http://anbg.gov.au/abrs/lichenlist/PHYSCIACEAE.html>
- Elix, JA (2014): *A Catalogue of Standardized Chromatographic Data and Biosynthetic Relationships for Lichen Substances*, 3rd edn. (Published by the author, Canberra.)

- Elix, JA; Kantvilas, G (2013): New taxa and new records of *Amandinea* (Physciaceae, Ascomycota) in Australia. *Australasian Lichenology* **72**, 3–19.
- Elix, JA; Kantvilas, G (2016): Mimics of *Amandinea coniops* (Physciaceae, Ascomycota) in Tasmania and New Zealand. *Australasian Lichenology* **78**, 22–31.
- Elix, JA; Malcolm, WM; Knight, A (2015): New records and new combinations of buellioid lichens (Physciaceae, Ascomycota) from New Zealand. *Australasian Lichenology* **77**, 36–41.
- Galloway, DJ (2007): *Flora of New Zealand Lichens*. Revised Second Edn. Manaaki Whenua Press, Lincoln.
- Scheidegger, C (2009): *Amandinea* Choisy ex Scheid. & H.Mayrhofer (1993). In *The Lichens of Great Britain and Ireland* (Smith, CW; Aptroot, A; Coppins, BJ; Fletcher, A; Gilbert, OL; James, PW; Wolseley, PA; eds). British Lichen Society, London. pp. 142–144.

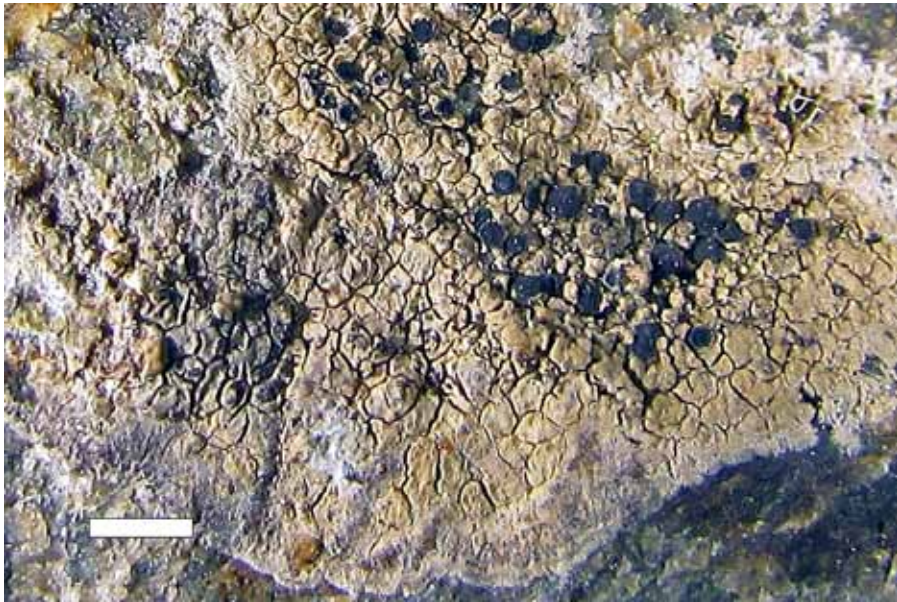


Figure 1. *Amandinea australasica* (holotype in GZU). Scale = 2 mm.



Figure 3. *Amandinea brunneola* (holotype in CANB). Scale = 1 mm.



Figure 2. Ascospore ontogeny of *A. australasica*. Scale = 10 μ m.



Figure 4. Ascospore ontogeny of *A. brunneola*. Scale = 10 μ m.



Figure 5. *Amandinea fuscoatratura* (Blaha 0136 in GZU). Scale = 2 mm.



Figure 7. *Amandinea julianae* (Streimann 34746 in CANB). Scale = 1 mm.



Figure 6. Ascospore ontogeny of *A. fuscoatratura*. Scale = 10 μ m.

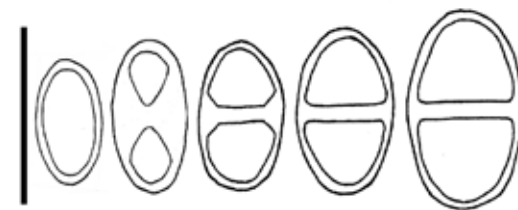


Figure 8. Ascospore ontogeny of *A. julianae*. Scale = 10 μ m.



Figure 9. *Amandinea litoralis* (holotype in W). Scale = 1 mm.

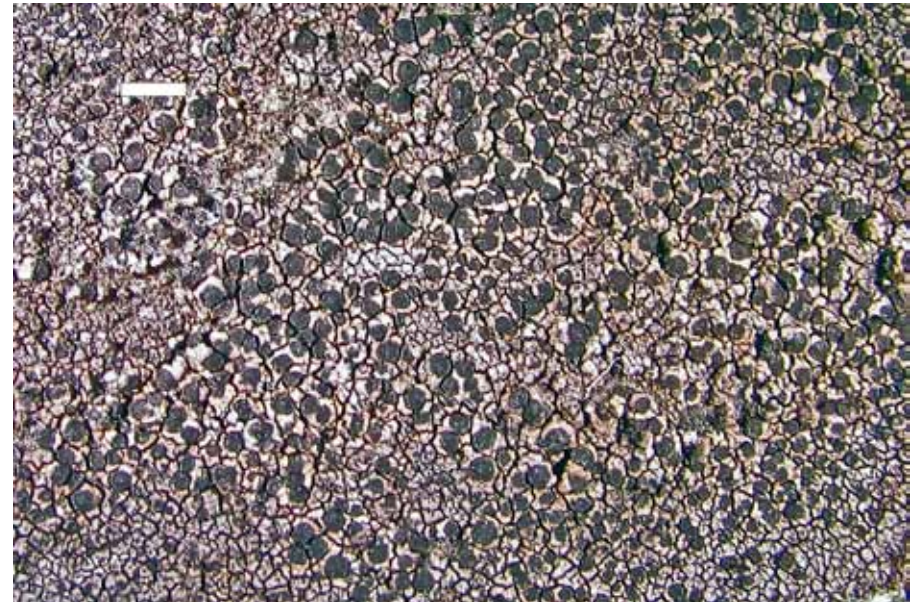


Figure 11. *Amandinea nitrophila* (Poelt 13.i.1989 in GZU). Scale = 2 mm.

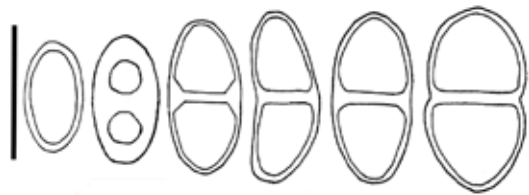


Figure 10. Ascospore ontogeny of *A. litoralis*. Scale = 10 μ m.



Figure 12. Ascospore ontogeny of *A. nitrophila*. Scale = 10 μ m.



Figure 13. *Amandinea variabilis* (holotype in GZU). Scale = 2 mm.



Figure 15. *Amandinea vitellina* (holotype in CANB). Scale = 1 mm.



Figure 14. Ascospore ontogeny of *A. variabilis*. Scale = 10 μm .



Figure 16. Ascospore ontogeny of *A. vitellina*. Scale = 10 μm .