

New species and new records of buellioid lichens (Physciaceae, Ascomycota) from New Zealand

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Abstract

Amandinea rangitatisensis Elix & H. Mayrhofer, *Buellia haywardii* Elix, A. Knight & H. Mayrhofer, *B. maungatuensis* Elix & H. Mayrhofer, *B. papanui* Elix & H. Mayrhofer, and *Tetramelas allisoniae* Elix, H. Mayrhofer & Glenney are described as new to science. *Rinodinella fertilis* var. *hypostictica* (Elix) Elix is recorded for the first time from New Zealand. *Tetramelas allisoniae* also occurs in Tasmania.

Introduction

The genus *Buellia* includes a large, heterogeneous assemblage of mostly crustose lichens with a chlorococcoid photobiont, lecideine to biatorine apothecia, and usually *Bacidia*-type asci with 1-septate, dark-pigmented ascospores. Research on buellioid lichens over the last decade or so has led to the segregation of several well-defined groups of species as separate genera, particularly for the corticolous taxa (Marbach 2000). Thus, *Buellia* in the strict sense is now limited to species with *Callispora*-type ascospores, bacilliform or weakly clavate conidia and a hymenium that is usually interspersed with oil droplets (Bungartz *et al.* 2008), i.e. the so-called *Hafellia* group (Moberg *et al.* 1999). However, there is a large residue of often-unrelated taxa that cannot be assigned to any segregate genera at this stage and remain classified in *Buellia* in the broad sense. Resolving the taxonomy of the Physciaceae/Caliciaceae clearly remains a challenge because sometimes the traditional characters offer insufficient resolution. For a sound phylogenetic re-assessment it will be necessary to use molecular tools and examine a broad, representative range of the diverse species in this group.

This paper continues our investigation of *Buellia*-like lichens in New Zealand, and follows from the previous accounts of *Buellia* and related genera (Elix *et al.* 2015, Elix 2016; Elix & Mayrhofer 2016) and our additions and revisions to *Amandinea* (Blaha *et al.* 2016; Elix & Kantvilas 2016a; Mayrhofer *et al.* 2016). In this paper, we deal with a new species of *Amandinea*, a further three new saxicolous species of *Buellia* in the broad sense as well as a new species of *Tetramelas*.

Methods

Observations and measurements of thallus and apothecium anatomy, asci, ascospores and conidia were made on hand-cut sections mounted in water and treated with 10% potassium hydroxide (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). Chemical constituents were identified by thin-layer chromatography (TLC) and high-performance liquid chromatography (HPLC, Elix 2014) and comparison with authentic samples.

New Species

1. *Amandinea rangitatensis* Elix & H. Mayrhofer, sp. nov.

MycoBank No.: MB 819345

Similar to *Amandinea coniois* (Wahlenb.) M. Choisy ex Scheid. & H. Mayrhofer, but differs by having a sorediate upper surface, immersed, cryptolecanorine apothecia with pruinose discs, and in containing atranorin.

Type: New Zealand, South Island, Canterbury, Rangitata Valley, Stew Point, 43°43'30"S, 171°05'20"E, alt. c. 440 m, on volcanic rocks, *H. Mayrhofer* 7435, *H. Hertel*, *C.D. Meurk* & *B.P.J. Molloy*, 17 Jan 1985; holotype: GZU.

Thallus crustose, to c. 35 mm wide and 1 mm thick, verrucose-areolate; individual areoles irregular, angular, 0.5–1.2 mm wide; upper surface grey-white, matt, very uneven, upper cortex eroding to form granular soredia in irregular, crateriform soralia; prothallus not apparent; medulla white, H_2SO_4 –, I–; photobiont cells 8–23 μm wide. *Apothecia* 0.4–1 mm wide, initially lecanorine, then biatorine and ultimately lecideine, with an accessory thalline margin that is soon excluded, mainly immersed, rarely adnate, dispersed or crowded, rounded or irregular through mutual pressure; disc black, grey-white pruinose, weakly concave to plane; proper excipulum distinct, persistent, thin, in section 50–55 μm thick, with the outer zone dark brown, K–, N+ orange-brown, paler brown within. *Epithymenium* 12–20 μm thick, dark brown, K–, N–. *Hypothecium* deep red-brown to dark brown, 150–180 μm thick, K–, N+ orange-brown. *Hymenium* 55–65 μm thick, colourless, not interspersed; subhymenium 20–30 μm thick, pale red-brown, not interspersed; paraphyses 1.5–2 μm wide, simple to sparsely branched, with brown apices, 4.5–5.5 μm wide; asci of the *Bacidia*-type, with 8 or fewer ascospores. *Ascospores* initially of the *Physconia*-type, *Buellia*-type when mature, 1-septate, medium to dark brown, ellipsoid, 14–[17.1]–20 \times 7–[9.2]–11 μm , not curved, becoming constricted at the septum; outer spore-wall strongly ornamented (rugulate). *Pycnidia* common, pyriform, immersed, black; conidia filiform, curved, 17–22 \times 0.7–1 μm . **Figs 1, 2.**



Fig. 1. *Amandinea rangitatensis* (holotype). Scale bar = 1 mm.

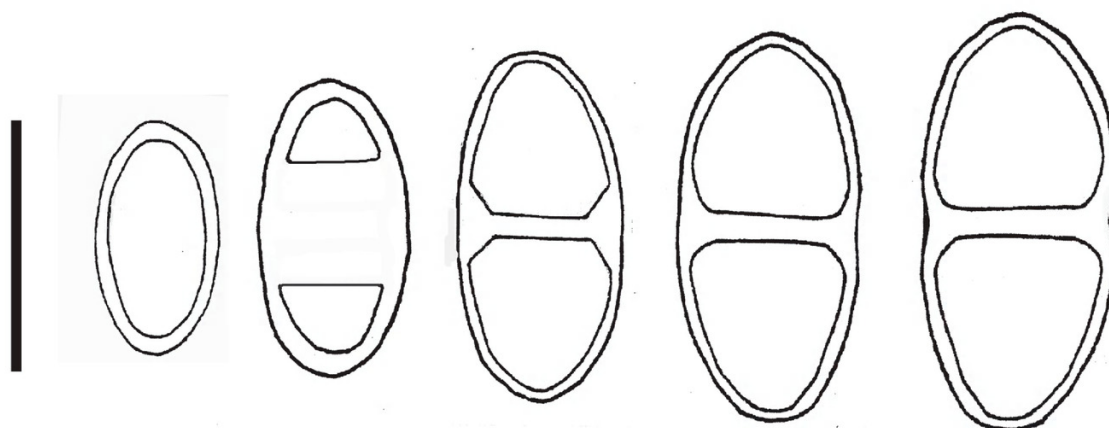


Fig. 2. Ascospore ontogeny of *A. rangitatis*. Scale = 10 μ m.

Chemistry: Thallus K+ pale yellow, C–, P+ pale yellow, UV–; containing atranorin.

Remarks: The genus *Amandinea* was resurrected by Scheidegger and H. Mayrhofer (Scheidegger 1993) and segregated from most other buellioid lichens by having filiform conidia. Both *A. rangitatis* and *A. coniops* are characterized by their relatively large, similarly-sized, 1-septate ascospores that become constricted at the septum and have ornamented outer walls, and by their curved, filiform conidia. However, *A. coniops* differs in having an esorediate upper surface 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. In addition, the apothecia of *A. coniops* are lecideine, broadly adnate with epruinose discs and that species lacks atranorin (Elix & Kantvilas 2016a). Another New Zealand lichen, *A. subbadioatra* (C. Knight) Elix & Kantvilas also contains atranorin, but it has an esorediate upper surface and much larger ascospores, 20–[25]–32 \times 10–[13]–16 μ m (Elix & Kantvilas 2016a).

Etymology: The species is named after the type locality.

Distribution and habitat: At present, *A. rangitatis* is known only from the type specimen. Associated species included *Buellia aethalea* (Ach.) Th. Fr., *B. ocellata* (Flot.) Körb., *Lecanora farinacea* Fée, *Lecidella stigmata* (Ach.) Hertel & Leuckert, *L. sublapicida* (C. Knight) Hertel, *Rhizocarpon geographicum* (L.) DC. and several *Xanthoparmelia* species.

2. *Buellia haywardii* Elix, A. Knight & H. Mayrhofer, sp. nov.

Mycobank No.: MB 819346

Similar to *Buellia mamillana* (Tuck.) W. A. Weber, but differs in having *Buellia*-type ascospores and in lacking 4,5-dichlorolichexanthone and atranorin.

Type: New Zealand, North Island, Rurima Island, W end of island, 37°50'S, 176°52'E, on cliff-top rocks, *B. Hayward* T34; holotype: GZU.

Thallus crustose, rimose-areolate, to 35 mm wide and 0.1 mm thick; upper surface white to off-white or grey-brown, smooth to verruculose, \pm becoming maculate; individual areoles irregular, angular, 0.5–1.5 mm wide; prothallus thin, black, marginal or not apparent; medulla white, lacking calcium oxalate (H_2SO_4 –), I+ purple; photobiont cells 8–16 μ m diam. **Apothecia** 0.2–0.6 mm wide, initially immersed then just adnate, lecanorine then biatorine or lecideine, separate or in small groups, thalline margin ultimately excluded with age; disc black, epruinose, weakly concave then plane or weakly convex; proper exciple thin, indistinct, in section thalline exciple 100–125 μ m thick, proper exciple deep olive-brown, 25–35 μ m thick, K+ orange forming red, needle-like crystals, N–. **Epithemium** 10–13 μ m thick, brown to olive-brown, K–, N–. **Hypothecium** pale brown to brown, 100–200 μ m thick, K+ orange forming red, needle-like crystals. **Hymenium** 100–130 μ m thick, colourless, not interspersed with oil droplets; paraphyses 1–1.5 μ m wide, sparsely branched, with apices 3–4 μ m wide and brown caps; asci of the *Bacidia*-type, 8-spored. **Ascospores** *Buellia*-type, brown, ellipsoid, 10–[13.3]–16 \times 5–[6.7]–9 μ m, older spores constricted at septum; outer spore-wall smooth to weakly ornamented. **Pycnidia** immersed, ostiole black; conidia bacilliform or weakly fusiform, straight, 6–10 \times 1–1.5 μ m. **Fig. 3.**

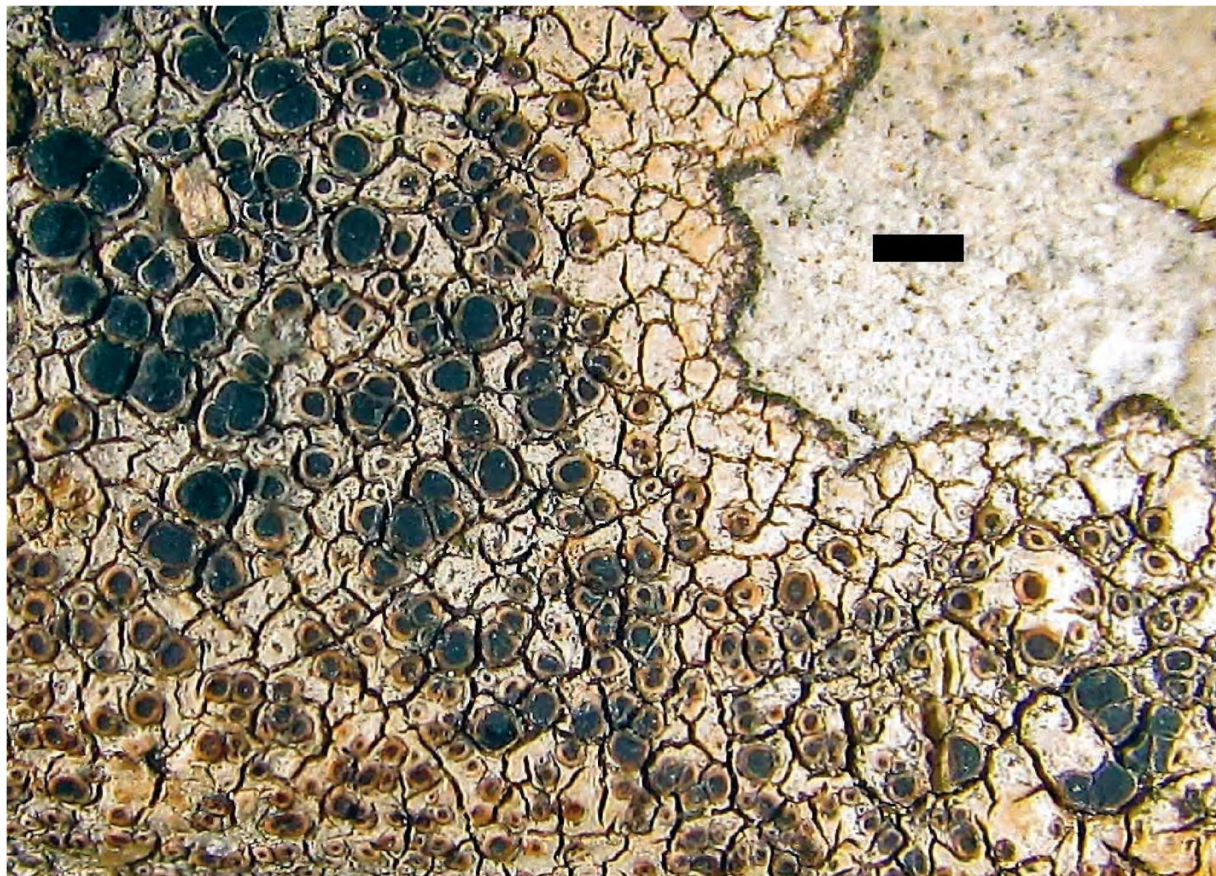


Fig. 3. *Buellia haywardii* (holotype). Scale bar = 1 mm.

Chemistry: Thallus K+ yellow then red, P+ yellow-orange, C–, UV–; containing norstictic acid (major), connorstictic acid (minor or trace).

Remarks: This new species belongs to *Buellia sens. lat.* (see above). *Buellia haywardii* is characterized by the crustose, rimose-areolate, white to grey-brown thallus, the immersed to adnate apothecia that are initially lecanorine, then biatorine or ultimately lecideine, the 1-septate, *Buellia*-type ascospores which become constricted at the septum and by the presence of norstictic acid. Morphologically, this species resembles some forms of *B. mamillana* (Bungartz *et al.* 2008), but the later has apothecia that soon become adnate or sessile, ascospores that have strongly ornamented outer walls and are initially of the *Physconia*-type during spore ontogeny and contains additional 4,5-dichlorolichexanthone and accessory atranorin.

Etymology: This species is named after the collector of the type specimen, Dr Bruce Hayward.

Distribution and habitat: *Buellia haywardii* is known from two localities in northern New Zealand where it grows on coastal, siliceous rocks. Associated species included *Amandinea pelidna* (Ach.) Fryday & L.Arcadia, *Buellia cranwelliae* Zahlbr. *Caloplaca cribrosa* (Hue) Zahlbr., *C. gallowayi* S.Y.Kondr. *et al.*, *Halecania subsquamosa* (Müll.Arg.) van den Boom & H.Mayrhofer, *Lecanora subcoarctata* (C.Knight) Hertel, *Pertusaria xanthoplaca* Müll.Arg. and *Xanthoria ligulata* (Körb.) P.James.

Additional specimen examined: NEW ZEALAND: NORTH ISLAND, Auckland, Kawau Island, Stockyard Bay, Bon Accord Harbour, 36°25'01"S, 174°49'34"E, alt. 2 m, on quartz in rock cliff, splash zone, A. Knight, 16 Feb 2015 (CANB, OTA).

3. *Buellia maungatuensis* Elix & H.Mayrhofer, *sp. nov.*

Mycobank No.: MB 819347

Similar to *Buellia fallax* Elix & Kantvilas, but differs in having cryptolecanorine apothecia, in containing medullary norstictic acid and in lacking calcium oxalate and hafellic acid.

Type: New Zealand, South Island, Otago, Mount Maungatua, SW of Dunedin, c. 500 m W of summit, 45°54'S, 170°08'E, alt. c. 850 m, on rock, *H. Mayrhofer* 10477, *H. Hertel* & *A.F. Mark*, 31 Jan 1985; holotype: GZU.

Thallus crustose, to 35 mm wide and 1.2 mm thick, epilithic, rimose-areolate, chinky, \pm subeffigurate at the margins; upper surface off-white to pale grey-brown, matt, cracked; prothallus not apparent or dark brown to black, marginal; photobiont cells 7–15 μm wide; medulla lacking calcium oxalate (H_2SO_4^-), I–. *Apothecia* 0.3–1 mm wide, lecideine, roundish, scattered, initially immersed and cryptolecanorine then broadly adnate to sessile; disc black, epruinose, plane then markedly convex; proper exciple thin, excluded with age, in section 50–70 μm thick, outer part dark brown to brown-black, K+ yellow then forming red, needle-like crystals, N–, inner part brown. *Epithymenium* 12–15 μm thick, dark brown, N–. *Hypothecium* 100–120 μm thick, brown to brown-black, K+ yellow then forming red, needle-like crystals, N+ orange-brown. *Hymenium* 100–120 μm thick, colourless, with a few scattered oil droplets; subhymenium 40–50 μm thick, pale brown, interspersed with oil droplets; paraphyses 1.5–2 μm wide, sparingly branched, with apices 5–6 μm wide and dark brown caps. *Asci* 8-spored or with fewer spores (4–6), *Bacidia*-type. *Ascospores* *Callispora*- then *Buellia*-type, 1-septate, pale then dark brown, ellipsoid, 15–[18.4]–20 \times 7–[9.3]–12 μm , becoming constricted at septum and broadly fusiform with age, sometimes curved, outer wall moderately to strongly ornamented. *Pycnidia* not seen. **Figs 4, 5.**



Fig. 4. *Buellia maungatuensis* (holotype). Scale bar = 1 mm.

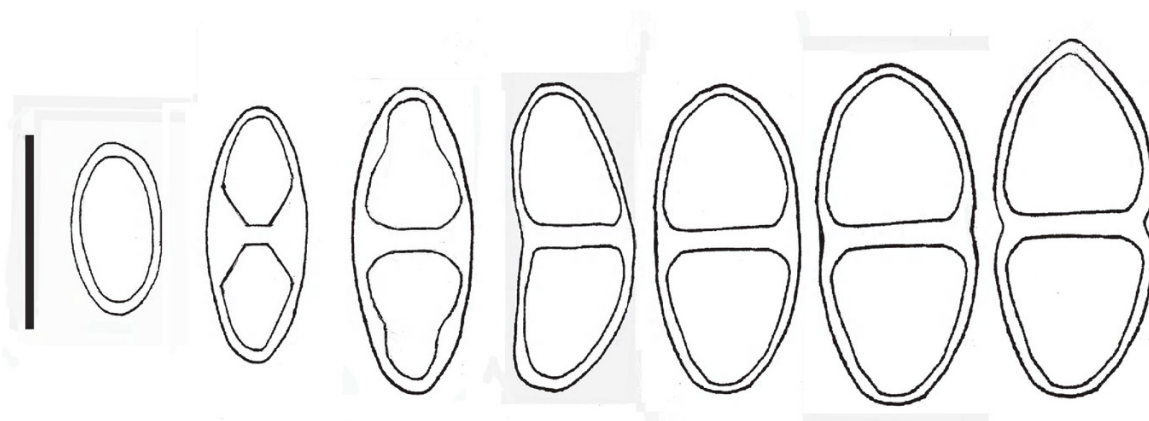


Fig. 5. Ascospore ontogeny of *B. maungatuensis*. Scale = 10 μm .

Chemistry: Thallus K+ yellow then red, P+ yellow-orange, C–, UV–; containing norstictic acid (major), connorstictic acid (minor or trace).

Remarks: This new species is characterized by the crustose, thick and chinky, rimose-areolate, off-white to pale grey-brown thallus, the inspersed subhymenium, epruinose discs, the sometimes curved, *Callispora*- then *Buellia*-type ascospores which often become broadly fusiform with age and have an ornamented outer wall, and by the presence of norstictic acid. *Buellia maungatuensis* closely resembles *B. fallax* Elix & Kantvilas which occurs in Tasmania and New Zealand (Elix & Kantvilas 2016b). *Buellia fallax* has similar ascospores but differs in having a medulla that contains calcium oxalate (H_2SO_4 +) and in containing atranorin and hafellic acid.

Etymology: This species is named after the type locality.

Distribution and habitat: At present, this new species is known only from the type locality. Associated lichens included *Amandinea subbadioatra* (C.Knight) Elix & Kantvilas, *Aspicilia caesiocinerea* (Nyl.) Arnold, *Buellia aethalea* (Ach.) Th.Fr., *B. ocellata* (Flot.) Körb., *Lecidea lygomma* Nyl., *Ramboldia petraeoides* (Nyl. ex C.Bab. & Mitt.) Kantvilas & Elix, *Rhizocarpon geographicum* (L.) DC., *Xanthoparmelia mougeotina* (Nyl.) D.J. Galloway and several *Umbilicaria* species.

4. *Buellia papanui* Elix & H.Mayrhofer, sp. nov.

Mycobank No.: MB 819348

Similar to *Buellia aeruginosa* Nordin, Owe-Larsson & Elix, but differs in having an olive-brown epihymenium and larger ascospores, $15\text{--}25 \times 10\text{--}15 \mu\text{m}$.

Type: New Zealand, North Island, Auckland, Papanui Point, Kawakawa Bay, E of Auckland, $36^\circ 56'S$, $175^\circ 13'E$, alt. 0–20 m, on coastal rocks, H. Mayrhofer 5890 & G.J. Samuels, 8 Jan 1985; holotype: GZU.

Thallus crustose, rimose to rimose-areolate, to 10 mm wide and 1.4 mm thick, individual areoles irregular, angular, 0.5–1 mm wide; upper surface creamy white to yellow-white, dull, epruinose; prothallus marginal, black; photobiont cells 7–13 μm wide; medulla white, containing calcium oxalate, (H_2SO_4 +) I+ purple in part. **Apothecia** 0.3–0.7 mm wide, lecideine, separate and \pm round, immersed then just adnate; disc black, often white-pruinose, weakly concave to plane; proper exciple prominent, persistent, swollen, elevated above disc, in section 50–70 μm thick, the outer part dark olive-brown to aeruginose-black, K+ blue-green, N+ purple-brown, paler brown within. **Hypothecium** 125–200 μm thick, brown to dark brown, K+ forming pale yellow solution, N+ orange-brown. **Epihymenium** 12–15 μm thick, pale to deep olive-brown, K–, N+ weak purple-brown. **Hymenium** 90–110 μm thick, colourless, not inspersed; subhymenium 50–65 μm thick, pale brown to aeruginose; paraphyses 1.5–2.0 μm wide, simple to sparsely branched, with apices 3–4 μm wide and olive-brown caps; **asci** of the *Bacidia*-type, 8-spored. **Ascospores** submuriform, 4–6-celled, with 3 transverse septa and (usually) 1 longitudinal septum on either side of the median septum, olive-brown to brown, oblong to ellipsoidal, $15\text{--}[19.5]\text{--}25 \times 10\text{--}[11.8]\text{--}15 \mu\text{m}$; outer spore-wall smooth. **Pycnidia** immersed to just emergent; conidia bacilliform, $3.5\text{--}6.5 \times 1\text{--}1.2 \mu\text{m}$. **Fig. 6.**

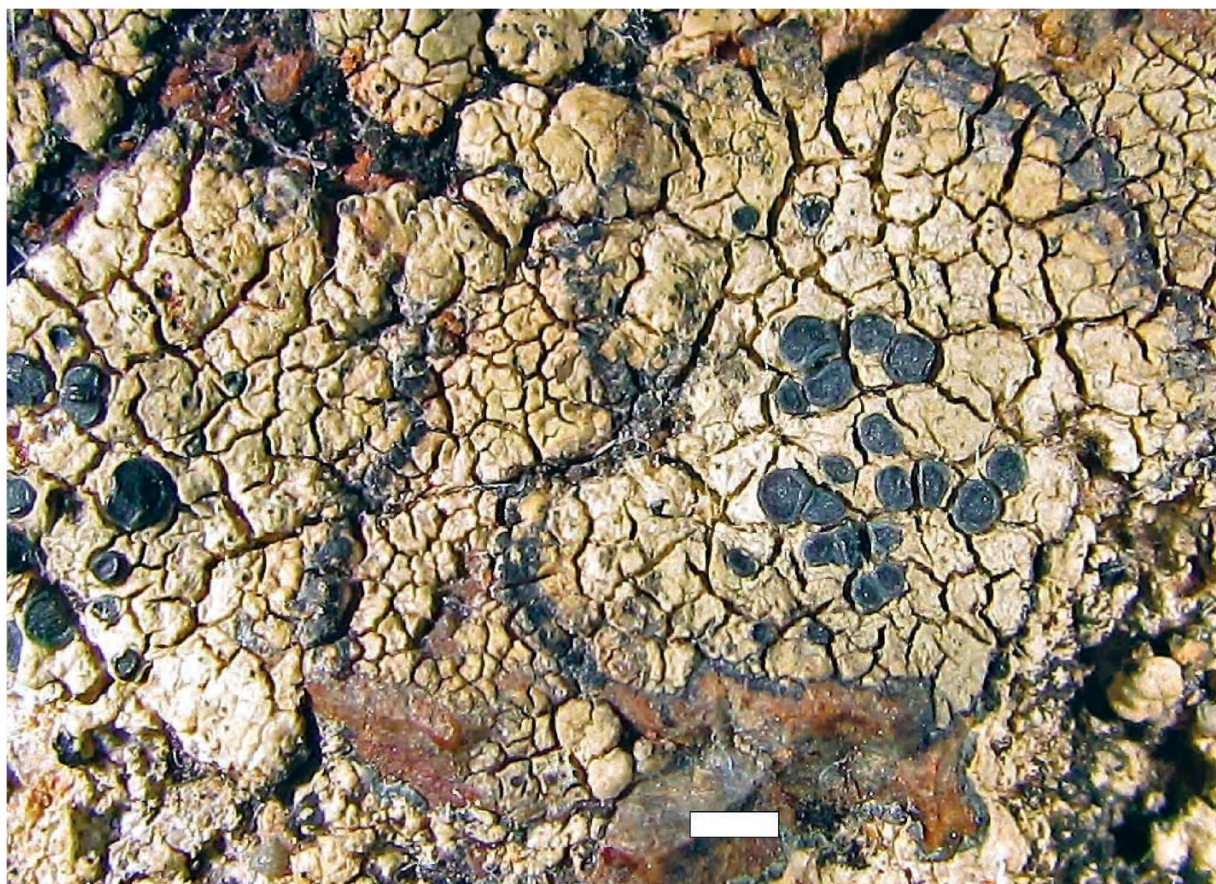


Fig. 6. *Buellia papanui* (holotype). Scale bar = 1 mm.

Chemistry: Thallus K–, C+ orange, P–, UV+ orange; containing isoarthothelin (major), 2,5-dichloronorlichexanthone (minor), 2,7-dichloronorlichexanthone (trace), arthothelin (trace), thiophanic acid (trace), asemone (trace).

Remarks: This new species belongs to *Buellia sens. lat.* (see above). *Buellia papanui* closely resembles *B. aeruginosa*, a very common species on coastal rocks in south-eastern Australia (Elix 2011). The two species are characterized by the presence of the same cohort of xanthones, an amyloid medulla, pruinose discs and similar ascospores, conidia and apothecial anatomy including similar reactions of the hypothecium and excipulum. However, *B. aeruginosa* differs in having an intensely aeruginose epihymenium (N+ strong red-violet), apothecia which are initially immersed but soon become broadly adnate to sessile, and smaller ascospores, 13–[16.2]–19 × 7–[9.1]–10 µm. In addition, the upper hymenium and subhypothecium are blue-green in *B. aeruginosa*, but colourless and pale brown respectively in *B. papanui*.

Etymology: This species is named after the type locality.

Distribution and habitat: At present, this new species is known only from the type locality. Associated lichens included *Amandinea coniops* (Wahlenb.) M.Choisy ex Scheid. & H.Mayrhofer, *A. pelidna* (Ach.) Fryday & L.Arcadia, *Buellia cranwelliae* Zahlbr., *Caloplaca litoralis* Zahlbr., *Pertusaria xanthoplaca* Müll.Arg., *Xanthoria ligulata* (Körb) P.James & D.J.Galloway and *Xanthoparmelia* species.

5. *Tetramelas allisoniae* Elix, H.Mayrhofer & Glenny, **sp. nov.**

Mycobank No.: MB 819349

Similar to *Tetramelas concinnus* (Th.Fr.) Giralt, but differs in having larger ascospores, 19–[23.1]–30 × 7–[10.3]–13 µm.

Type: New Zealand, South Island, Otago, Split Rock, Seacliff, 45°39'49"S, 170°38'11"E, alt. 240 m, on flat top of basalt outcrop in forest remnant, A. Knight, 24 May 2014; holotype: OTA; isotype: CANB.

Thallus crustose, continuous, rimose-areolate, to 40 mm wide and 0.7 mm thick; areoles irregular, angular, 0.3–1 mm wide; upper surface pale yellow to yellow-green or bright yellow, dull, verrucose-roughened, epruinose; prothallus black and marginal or not apparent; photobiont cells 7–15 µm wide; medulla white,

lacking calcium oxalate, (H_2SO_4 –), I+ intense purple. *Apothecia* 0.3–1.1 mm wide, lecideine, separate and \pm round to crowded and distorted by mutual pressure, immersed at first, becoming broadly adnate; disc black, epruinose, weakly concave to plane, markedly convex with age; proper exciple prominent, elevated above disc but excluded in older, convex apothecia, in section 30–55 μm thick, the outer part dark brown to brown-black, K+ yellow solution, N– or N+ weak orange-brown, paler brown within. *Hypothecium* 100–150 μm thick, brown to brown-black. *Epithymenium* 10–13 μm thick, olive-brown to dark brown, K–, N–. *Hymenium* 110–130 μm thick, colourless, \pm with scattered oil droplets; subhymenium 30–50 μm thick, pale brown to brown; paraphyses 1.5–2.0 μm wide, simple to sparsely branched, with apices 3.5–4.5 μm wide and brown caps; *asci* of the *Bacidia*-type, 8-spored. *Ascospores* initially of the *Callispora*- or *Physconia*-types, then of the *Buellia*-type, 1-septate, brown, ellipsoid to broadly fusiform, 19 – $[23.1]$ – 30×7 – $[10.3]$ – $13 \mu\text{m}$, becoming constricted at the septum, often curved, sometimes 2–3 septate when mature; outer spore-wall finely ornamented (microrugulate). *Pycnidia* immersed, punctiform, conidia bacilliform to elongate-ellipsoid, 3 – 5.5×1 – $1.5 \mu\text{m}$. Figs 7, 8.

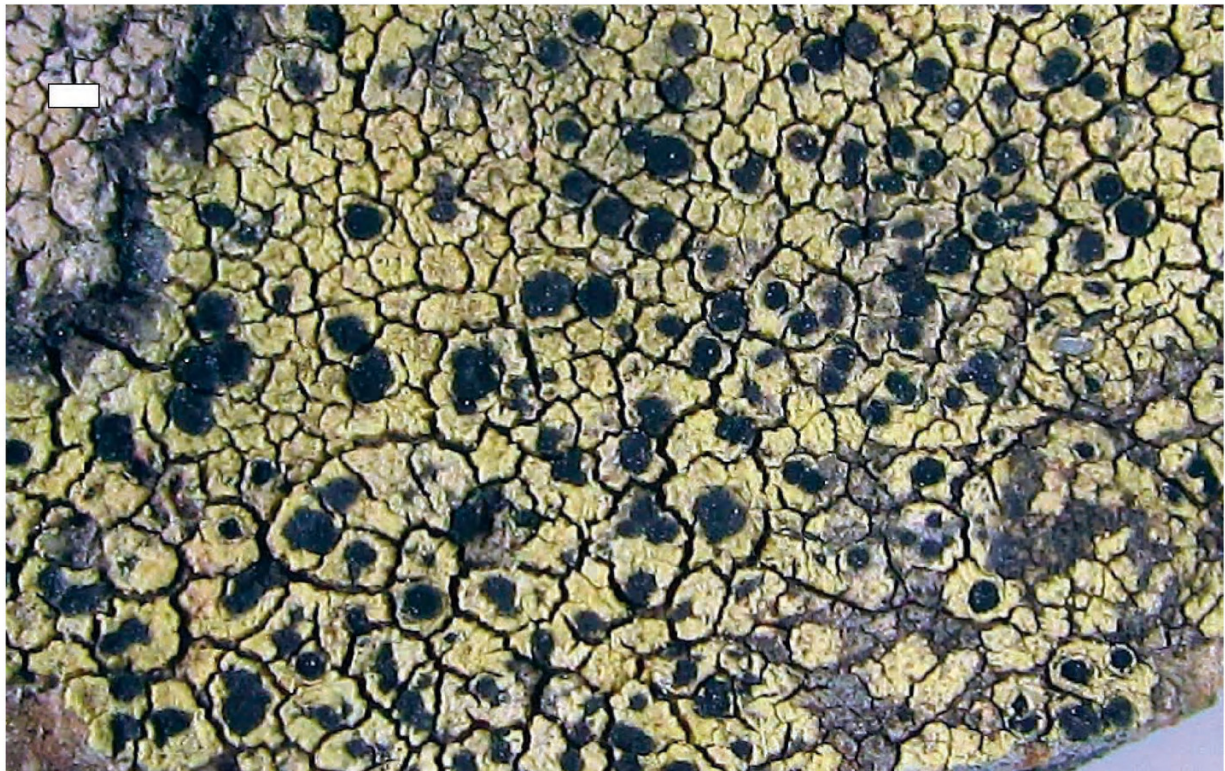


Fig. 7. *Tetramelas allisoniae* (holotype). Scale bar = 1 mm.

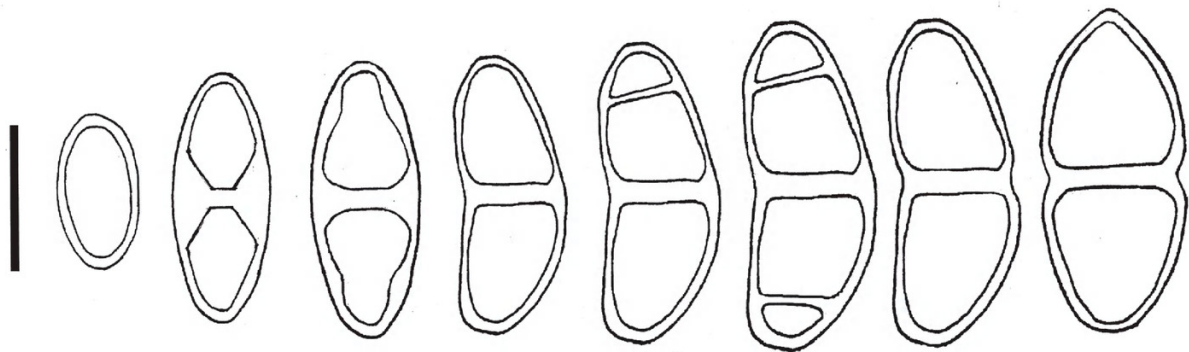


Fig. 8. Ascospore ontogeny of *T. allisoniae*. Scale = 10 μm .

Chemistry: Thallus K⁺ yellow, C⁺ orange, KC⁺ deep orange, P[–], UV⁺ orange; containing arthothelin (major), atranorin (minor or trace), \pm thiophanic acid (trace), \pm 4,5-dichloronorlichexanthone (trace) or 6-O-methylarthothelin (major).

Remarks: Phylogenetic studies have confirmed that the genus *Tetramelas* Norman constitutes a well-founded segregate from *Buellia sens. lat.* (Helms *et al.* 2003; Nordin & Tibell 2005). Diagnostic characters include the presence of xanthones (arthothelin or 6-O-methylarthothelin) and commonly curved, 1–3-septate ascospores with pointed apices that show *Callispora*-type thickenings in early ontogeny. *Tetramelas allisoniae* exhibits all of these characteristics. In many respects this new species resembles *T. concinnus*, a widely distributed species in the Northern Hemisphere (Bungartz *et al.* 2008, Giralt *et al.* 2009). Both lichens are characterized by the presence of arthothelin, an amyloid medulla and similar ascospores (which may become 2- or 3-septate at maturity), conidia and apothecial anatomy including similar reactions of the hypothecium and epihymenium. However, *T. concinnus* has a thinner hymenium, 60–80 μ m thick, and smaller ascospores, 13–[18.5]–23 \times 6.5–[8.9]–11 μ m with rugulate outer spore-walls.

Etymology: This species is named after our colleague and the collector of the type specimen, Dr Allison Knight.

Distribution and habitat: At present, this new species is known from hinterland rocks in New Zealand and a single collection from alpine Tasmania. In New Zealand associated species included *Aspicilia caesiocinerea* (Nyl.) Arnold, *Buellia aethalea* (Ach.) Th.Fr., *B. ocellata* (Flot.) Körb., *Lecidea lygomma* Nyl., *Ramboldia petraeoides* (Nyl. ex C.Bab. & Mitt.) Kantvilas & Elix, *Rhizocarpon geographicum* (L.) DC. and several *Xanthoparmelia* species.

Additional specimens examined: AUSTRALIA: TASMANIA: Harz Peak summit, 43°15'S, 146°46'E, alt. 1250 m, on the sheltered eastern face of an alpine, dolerite tor, *G. Kantvilas* 500/14, 14 Dec 2014 (HO). NEW ZEALAND: SOUTH ISLAND: Canterbury, Banks Peninsula, Te Oka, S of Little River, 43°48'18"S, 172°47'18"E, on basalt, *J. Blaha* 090 *pr.p.*, 11 Mar 2001 (GZU); Canterbury, Montserrat, end of Reeces Road, SE of Omihi, 43°04'S, 172°56'E, alt. 400–450 m, on limestone outcrops, *H. Mayrhofer* 12086 & *C.D. Meurk*, 2 Sep 1992 (GZU); Otago, Macraes Hill near Dunedin, on rock, *J.S. Thomson* T2466 (CHR).

New Record

Rinodinella fertilis var. *hypostictica* (Elix) Elix, *Australas. Lichenol.* 66: 46 (2010)

Rinodinella halophila var. *hypostictica* Elix, *Australas. Lichenol.* 65: 14 (2009). Type: Australia, New South Wales, Tuross Head, 36°04'S, 150°08'E, alt. 1 m, on rocks along the foreshore, *J.A. Elix* 2086, 24 Apr 1976 (CANB).

This taxon was previously known from coastal rocks in New South Wales (Elix 2009). Morphologically, it is identical to *R. fertilis* (Körb.) Elix var. *fertilis*, but it can be readily distinguished chemically since the latter contains norstictic acid (major) and connorstictic acid (minor) whereas *R. fertilis* var. *hypostictica* contains hypostictic acid (major) and hyposalazinic acid (minor). A detailed description is given in Elix (2009).

Specimen examined: NEW ZEALAND: SOUTH ISLAND: Nelson, Tata Beach, Golden Bay, W of Nelson, 40°48'42"S, 172°54'53"E, on coastal sandstone rocks, *J. Blaha* 080, 4 Apr 2001 (GZU).

Acknowledgments

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